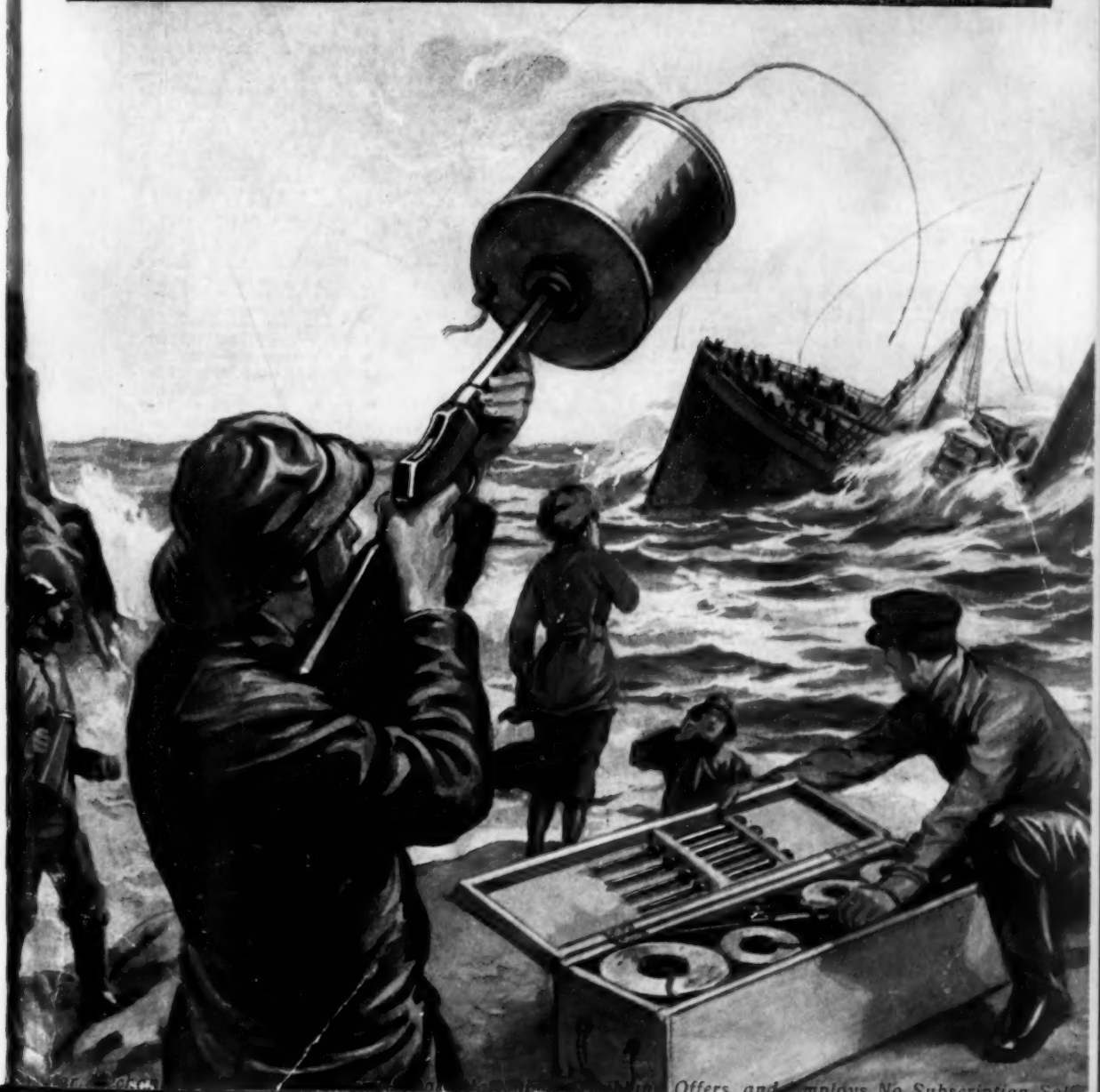
January 25 Cents

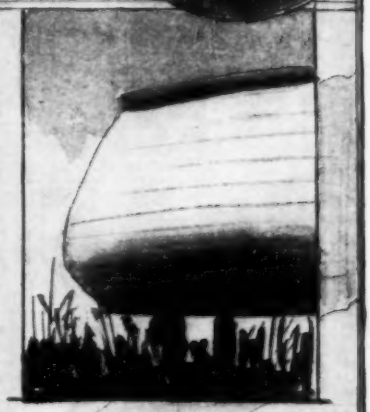
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG U.S. PAT. OFF. REGD. TRADE MARK GREAT BRITAIN



Offers, and employs No Subscription Solicitors



IF YOU LIKE BOATS
YOU'LL SURELY ENJOY THIS!

At top—Original model of the Cypress Motor Launch "Mary M.," plying in Northern Lake Waters. (Signed by the Designer.)

In Circle—Capt. John Martinek, Designer and Builder—with his own unaided hands.

In Square—Side view of stern of the Cypress Launch "Mary M."— before launching.

At Bottom—Bow view of the Cypress Motor Boat "Mary M." just before she slid into the water. (Compare with picture of original whittled model at top of page.) Aren't the lines beautiful? And isn't Old John a wizard? All figured out with his knowledge and his penknife. She is 32½ feet over all, 7½ foot beam, draught (light), at bow 13 inches, at stern 2½ inches. Seating capacity 36. 30 h.p. ALL CYPRESS except her oak keel and ribs, rail and awning frame! (Jim Johnson knows about her.)

Anybody Who Knows All About Boats Says "Cypress"

—OF COURSE. Thus spake John Martinek, who does nothing but build boats and smile on the children who come to his busy little shipyard.

The Next Thing for YOU to Do Is to Write for the Cypress Boat Book

29 PICTURES AND 16 CHARTS

It's Vol. 19 of the famous Cypress Pocket Library and its 116 pages are free on request. (Promptly, too.) We like boats as well as you do—if they're good ones, well built and of the right material, such as Capt. John knows about. ***Write for free Vol. 19.***

SOUTHERN CYPRESS MFRS.' ASSN.
1219 Poydras Bldg., New Orleans, La., or
1219 Graham Bldg., Jacksonville, Fla.

Index to Volume XXXVII, 1922

Academy, U. S. Aeronautical, Investigate Creation of 831
Accelerator Air Cylinder Attachment Aids Smooth Running 274
Accident Contest, Employes, to Boost Factory Safety Inspectors 274
Accident First Aid Box Installed on Busy Berlin Street 354
Accident Parade, Safety First, in Syracuse, New York 392
Accidents, Coal Mine, for 1921 504
Accidents, Lock and Chain Prevent 296
Accidents Show Mining Occupation Hazardous 378
Accidents:
  Airplane Take-Off Kills One and Injures Several 387
  Airplanes, Two London — Paris, Collide and Fall 869
  Automobile Striking Gas Causes Fire and Explosion 505
  Bridge, Bascule, Rolls Over Backward 377
  Dirigible "Roma" Meets with Disaster, by H. H. Windsor 518
  Fire Engine, Japanese, Hangs Over Side of Bridge 372
  Lamp Post Crashes through Top of Auto 547
  Locomotive Explodes with Unusual Violence 907
  Locomotive Thrown on Side of Hill in Collision 172
  Motor Truck, Runaway, Demolishes Army Barracks 885
  Theater, Knickerbocker, Wrecked by Collapse of Roof 587
Acetylene as Primer for Cold Engines 950
Acetylene Tanks, Locating Leaks in 141
Acetylene Torch, Gas Control Regulator for 118
Acid Carboys, Rubber Trough for 141
Adding and Checking Machine, Lightweight Cash Register Is 367
Adding Machine and Cash Drawer in One .. 352
Adhesive Tape as Hose Supporters 642
Adjuster, Automatic Slack, for Brake Rods 891
Advertising Appliances:
  Automobile Speaks for Itself with Aid of Amplifier 25
  Balloons, Toy, Novel Window Display with 144
  Floor Covering, Street Stunt Tests 739
  Linoleum on Sidewalk Shows Wearing Qualities 266
  Sewing Machine Prospects Heralded by Electric Buzzer 550
  Windmill, Dutch, for Los Angeles Store .. 85
  Wood Figures Attract Attention at Store Windows 106
Aerating Apparatus, Water, for Bathtub 60
Aerial Photographs, Check Hydographic Survey by 733
Aero Sled, Powerful 305
Aeronautical Academy, U. S., Investigate Creation of 831
Aeronautics:
  Air Craft Base, North Island, Calif. to be Used as 353
  Air Craft Chamber of Commerce Organized 429
  Air Craft Fittings and What They are Made of 81
  Air Craft, Naval and Marine, Make Extensive Flights 218
  Air Liners, Lighthouse for Guiding, by Everett J. Lovett 670
  Airmen, Three Dimension Weather Maps for 441
  Airplane and Auto Tie in Tug of War 236
  Airplane Arresting Tackle for Use on Ships 508
  Airplane Clock, Electrically Wound 122
  Airplane Collision, London — Paris Air-Route 869
  Airplane, Diamonds Quickly Transported from Mines by 407
  Airplane Efficiency, Larson Trophy for 323
  Airplane Endurance Flight, America Sets World's Record for 380
  Airplane Engine, Diesel Type, Italian 344
  Airplane Engine, Light Highpower, of British Design 541
  Airplane Engine Silencer of Swiss Design. 490
Aeronautics: (Continued)
  Airplane Engines, Supercharging Compressor for 386
  Airplane, First Royal, Built for King Albert of Belgium 31
  Airplane, Folding Wing, as Automobile .. 164
  Airplane, French, Has Lower Wing Larger Than Top 919
  Airplane Generator, Wireless, Driven with Single Blade Propeller 865
  Airplane, Goliath, Controlled with Automatic Pilot 857
  Airplane Held Motionless by High-Velocity Wind 359
  Airplane, Kittens are Good-Luck Mascot for 773
  Airplane, Man-Propelled, Prize Offered for 651
  Airplane, Model, Propeller Bearing for 646
  Airplane Motor, Best, Prizes Offered for. 159
  Airplane, Motorless German, Shows Great Stability 505
  Airplane, Motorless, Remarkable Flight in Switzerland with 819
  Airplane, New Spad, Has Clean Lines 895
  Airplane, North Pole Flight, Christening of 877
  Airplane Service, Commercial, Starts in California 870
  Airplane, Small Is New Customer for the Gasoline Filling Station 843
  Airplane, Small French, Has Demountable Wings 45
  Airplane Stability Demonstrator 328
  Airplane Stability Tests to Make Flying Safe 52
  Airplane Survey, Photographic, of Great Lakes—St. Lawrence Waterway Made by Canada 536
  Airplane Swing, How to Make 959
  Airplane Take-Off Kills One and Injures Several 387
  Airplane Uses Kerosene Successfully 920
  Airplane View of Muscle Shoals and Nitrate Plant 327
  Airplanes and Airships, Surveying Parties Use 90
  Airplanes, Automatic Angle Indicator for 714
  Airplanes, Auxiliary Starting Engine for. 364
  Airplanes Guided through Night and Fog by Wireless Waves, by H. A. Lane 329
  Airplanes, Motorless, Show Great Progress 212
  Airship "Napoli," Italian, Has Electrically Operated Kitchen 569
  Airship Service, Proposed, between England, India, and Australia 848
  Airships, Dirigible, Great Britain Abandons 694
  Airships, German, to be Manufactured in America 918
  Airships, New Noninflammable Gas Produced for 906
  Aviation Field, $2,000,000, Recently Completed 250
  Balloon Control, Teaching to Observers, by Frank B. Howe 225
  Balloon Flight Teaches Valuable Lesson. 560
  Balloon, Helium Inflated, First Flight of. 230
  Balloon Messages, Wireless Telephone, Sent Successfully 230
  Balloons, Electrically Wound Clocks for .. 122
  Dirigible, Helium Inflated, First Flight of 230
  Dirigible "Roma" Meets with Disaster, by H. H. Windsor 518
  Dirigible "Roma" Victims, Last Rites for 754
  Dirigibles a Complete Failure, by H. H. Windsor 519
  Hydroglider, Japanese, for Travel on Water 907
  Multiplane of French Design 384
  Seaplane Flight, Trans-Ocean, by H. H. Windsor 845
  Seaplane, Mono, being Tested at Rockaway Air Station 105
  Seaplane, Wrecked, Halts Portuguese Airman 841
  Seaplanes, Spotting, Bids on, Asked by Navy Bureau 507
  Triplane, Armored, Carries Cannon and Six Machine Guns 816

410808

Agents, Magazine, a Fraud as Far as Popular Mechanics is Concerned..... 160
Aggregate, Concrete, Blower Reduces Cost of 623
Agricultural Implements, Draft Necessary for 643
Agricultural Implements:
Brush Hook Made from Shovel..... 976
Cultivator, Motor Vineyard, Operated by One Man 724
Dumping Car, Monorail..... 910
Garden Mulcher, Novel, How to Make.... 813
Harrow Plows and Pulverizes in One Operation 861
Harvester, Kafir Corn, Heads Two Rows Simultaneously 490
Harvester, Sugar Cane, by Robert Grimshaw 494
Harvester Thresher, Combined, Motor to Operate 774
Hay Stacking Machine Saves Time and Labor 71
Header for Kafir Corn..... 781
Header Thresher, Combined, Proves Economical 597
Hoe, Garden, Double Action..... 969
Hoe, Guard Prevents Dulling of..... 973
Ladder Has Auxiliary Legs for Leveling. 912
Peppermint Root Planting Machine, Automatic 433
Plow or Planer, Portable Machine May be, by Henry S. White..... 530
Plow, Tractor Drawn Brush, for Land Clearing 864
Potato Planter Made from Old Corn Planter 956
Rake, Self-Cleaning Lawn, to Aid Gardener 515
Rice Stripping Machine Collects Rice from Standing Stalks 692
Seeder, Simple, How to Make..... 971
Soil Crusher Made from Mower Wheels.. 486
Sprayer, Potato Plant, How to Make..... 795
Stump Cutter, Rapid Power Driven..... 203
Stump Removing Machine Leaves Only Chips 879
Thresher and Baler Combined Saves Time and Money 732
Threshing Machine, Giant, Made from Seven Others 381
Tile Ditcher, Horse-Drawn..... 913
Tractor Attachment is Plow and Weed Killer 417
Tractor, Farm, Has Three Wheel Drive.. 76
Tractor, French, Simple and Original..... 401
Tractor, Hillside Leveling Attachment on. 334
Tractor, Lightweight, Operates by Steam. 377
Tractor, Small, Usable for Various Purposes 685
Tractor Track Treads Give Greater Pulling Power 916
Tractor Used for Various Farm Duties.. 944
Tractor, Walking, for Use on Plowed Soil 350
Tractors, Five, Reduce Farming to Single Operation 901
Transplanting Tool for Plants..... 808
Weed and Insect Exterminating Machine. 423
Weeding Seat, Garden, Prevents Backaches 6
Wheat Cleaning Machine for Use with Thresher 689
Windlass Holds Hay on Truck..... 956
Agriculture:
Beans, Dwarf Variety, Planting..... 797
Berry Picking Made Easy..... 962
Blueberry Experiments Give Remarkable Results 752
Corn, How to Plant..... 973
Corn, Sweet, How to Plant..... 954
Cotton, Blue, Now Bleached to Increase Its Value 864
Cotton Seed Treatment Eliminates Diseases 886
Cranberry Bogs, Artificial, in the Northwest, by Lawrence W. Pedrose..... 409
Date Harvesting Requires Skill and Agility 924
Grain Raising on a Lake Bottom, by Fred S. Walker 395
Hay Stacking by Gravity..... 948
Kudzu, Forage Plant and Soil Builder, by C. E. Pleas..... 909
Land Requirements, Government Scientists to Study..... 57
Mulching Paper Prevents Weed Growth.. 830
Agriculture: (Continued)
Orange Grove, Propellers Circulate Air to Heat 902
Pecan Tree Culture to be Tried in China. 896
Soil, Irrigated, Cultivation Difficult on.... 432
Spinach Pickers Use Boats on Large Chinese Marshes 678
Tree Surgery Patented, Certain Features of 940
Air Compressor and Hoist on One Support. 922
Air Compressor, Overheated, Stopped by Fusible Plug 868
Air Cylinder Attachment for Accelerator Aids Smooth Running..... 274
Air Hose, Coin Operated, for Garages..... 423
Air Moisture Eliminators, Demountable..... 929
Air Port for Ships, Improved, Have No Tumble Bolts 437
Air Recording Instrument for Furnace Gases 73
Airmen's Wireless Outfit Combined with Oxygen Helmet 880
Alarm, Auto-Theft, Improvised..... 874
Alarm, Burglar, Shooting Rat Trap as..... 482
Alarm Circuit for Open Fuses..... 794
Alarm Clock Turns on Electric Lights..... 312
Alarm Signal, Shooting, for Protection Against Burglars 818
Alcohol as By-Product of Mexican Plant.... 934
Alcohol, Denatured, Always a Dangerous Poison 402
Alcohol, Wood, Using..... 140
Aliens to be Deported May be Held Four Months 701
Alinement Jig, Universal, for Crankshafts and Pistons 77
Alkaline Water Made Drinkable..... 307
Alloy, Iron Silicon, Melted by Chemical Heat 560
Alloys, Aluminum, Investigate Properties of 717
Alloys, Copper and Lead, Bureau of Mines to Study Preparation of..... 753
Alloys, High Melting Point, Less Subject to Corrosion 496
Altars, Portable, Installed on Passenger Steamers 716
Altitude on Life, High, Scientific Study of Influence of 54
Aluminum, Action of Metallic Salts on..... 612
Aluminum Alloys, Investigate Properties of 717
Aluminum, Consistency of, Bureau of Mines is Investigating 677
Aluminum Milking Stool, Sanitary..... 366
Aluminum, Slingshot Made of..... 937
Aluminum Treatment Prevents Metal Oxidation 360
Amber and Olive-Drab Color, How to Make. 978
American History Essays, Prizes Offered for 487
American Legion Post, Tribute Paid to..... 46
Ammonia Compressors, Repairing Small.... 127
Ammonia for Cooling Hot Bearings..... 286
Ammonia Produced Chemically 346
Amplifier Makes Auto Speak for Itself..... 25
Amplifier, Phonograph Tone, Auxiliary Sound Box on 553
Amplifier, Vacuum Tube, Aids Partially Deaf 704
Amplifier, Wireless, Ordinary Receivers Used with 736
Amplifiers to Give Flood Warnings, by H. A. Lane 9
Anaesthetic Chamber, Special, for Animals.. 703
Anchor, Boat, Old Propeller as..... 479
Angle Indicator, Automatic, for Airplanes.. 714
Animal, Smallest in the World, Capturing, by Leon Augustus Hausman 69
Animal Toys and Dolls Made of Inner Tubes 164
Animal Tracks, Prehistoric, Found in Kentucky 738
Animal Training Behind the Guard Ropes, by Frank Braden 705
Animals Carved from Soap as Window Display 445
Animals, Kindness to, Poster Contest for.651, 815
Animals, Special Anaesthetic Chamber for.. 703
Animals, Wild, Photographing 633
Animals:
Bear Cubs, Newly Born..... 608
Buffalo Fur to be Sheared as Substitute for Wool 407
Camel Control, Nevada Legislature Passes Law for 665
Cat Laps Milk with Its Paw..... 609
Cattle, Blooded, Identified by Nose Print. 915

Animals: (Continued)
Chimpanzees Ride on Steam Engine..... 445
Dog Propels Auto for Movie Actor..... 609
Dog Team Derby, Great American..... 751
Dogs, French Army, Parisians Contemplate Memorial in Honor of..... 736
Dogs Used for Winter Travel in Northern Quebec 59
Elephant, Wooden Leg for, as Added Attraction 868
Elephants Board Train at Passenger Station 38
Elephants Destroy Oil Pipe Line in Island of Sumatra 567
Elephants Used to Test Flooring..... 719
Fox Hounds, Specially Designed Auto to Carry 887
Gophers, Traps Catch Wholesale..... 206
Horse, Artificial Nose Placed in Neck of. 935
Horse, Boards Steamer in Special Stall... 77
Horse Show, New Kind of, by Frank B. Howe 12
Kangaroo Tries to Throw Athlete..... 121
Kittens are Good Luck Mascots for Airplane 773
Lioness, Large, Treated for Ulcerated Tooth 52
Ox, Gigantic, Exhibited in Australia..... 84
Rabbit Sits in Tree..... 936
Rabbits as Protection from Mosquitoes... 162
Reindeer Acclimatized in Baffin Land.... 360
Reindeer Raising Attempted in Michigan. 742
Sea Lions Play Havoc with Fishing Industry 674
Seal, Baby, Forced to Eat When on Hunger Strike 609
Seals, Migrating, Travel in Military Formation 237
Squirrel, Pet, Rides Phonograph as Merry-Go-Round 444
Walrus Ivory Carvers of Bering Sea, by G. Dallis Hanna..... 761
Annealing Polished Medals Without Tarnishing 716
Anthills, Skyscraper, South African Ants Build 679
Anvil, Handy Riveting..... 141
Anvil or Trestle, Convenient, Made from Steel Rail 622
Apartment Houses to be Wired for Radiotelephones 738
Apples, Ventilated Storage House for..... 938
Apples Wrapped in Oiled Paper Stop Scald. 738
Apron, Novel, for Kitchen or Shop..... 799
Aqueduct, Wooden Canal, Replaced with Steel 757
Arbor Day—Tree Planting Year, First Semicentennial 324
Arbor, Gate, Made from Wagon Wheel..... 645
Arbor Press, Large Capacity, How to Make 775
Arbor Press Made from Old Vise..... 465
Arbors, Improved Centers for..... 294
Arc Welding Machine Uses Alternating Current 848
Arc Welding Outfit Has Novel Current Control 74
Arcade Arches, Long Series of, Afford Study in View 684
Arch, Bridge, Erected in Twenty-five Days. 81
Arch, Granite, to Mark State Line on Meridian Trail 247
Arch, School Bridge, as Memorial to War Veterans 926
Arches, Long Series of, Afford Study in View 684
Architecture, Decorative, in Molded Concrete 722
Arm, Artificial, Overcomes Handicaps..... 241
Armistice Day, by H. H. Windsor..... 27
Armless, Industrial Rehabilitation of the, by Wm. A. McGarry..... 33
Armrest, Auto, Attachable to Door..... 938
Army Pup Tent, Improving and Waterproofing 644
Arresting Tackle, Airplane, for Use on Ships 508
Arrow Cut on Shaper Feed Pawl Saves Time 792
Arrow, Whistling 151
Arsenic Mining and Refining in Virginia, by Phil W. Hanna..... 79
Art Glass as Showcards..... 471
Art—Statue, Lifelike, Japanese Wood Carver Cuts 312
Art Treasures, Italian, Motion Pictures Show 584
Artichokes as Possible Source of Sugar..... 202
Artificial Arm Overcomes Handicaps..... 241
Artificial Limb Permits Natural Knee Motion 184
Artists, Magnifying Glass Holder for..... 465
Asbestos Insulating Mats Have Many Advantages 703
Ash Pan Has Screen Bottom..... 115
Ash Receptacle, Automobile, for Smokers... 733
Asphalt, Old, Used for Winter Street Repair Work 232
Asphalt Pavement Dug Up with Work-Car Tool 96
Asphalt, Removing from Concrete with Gasoline 184
Association of Commerce, Enterprising Junior, by H. H. Windsor..... 845
Association, Organic Chemical, New..... 323
Astronomy:
Planet Venus, Atmosphere of, Contains No Oxygen 714
Relativity, Theory of, to be Further Tested 588
Saturn's Rings will be Dispersed by Its Satellites 488
Star Map, Luminous 101
Sunspots Consist of Gases Cooled by Expansion 414
Athlete, Movie, Defeats Horse in Foot Race 232
Athletic Awards, Standardization of, Colleges Advocate 816
Atomic Structure of Matter, X-Rays Reveal, by Rogers D. Rusk..... 111
Atomizer Device for Fuel in Gasoline Engines 436
Attic Room Space, "Built In" Drawers Save 960
Attritiometer Tests Durability of Fur..... 428
Auctioneering Machine Works Electrically.. 224
Automobile Accelerator, Air Cylinder Attachment Aids Smooth Running..... 274
Automobile Accessory Keeps Daily Expense and Mileage Record 260
Automobile and Airplane Tie in Tug of War 236
Automobile and Motorboat in One..... 183
Automobile and Tractor Make Pioneering Easy 715
Automobile Armrest Attachable to Door.... 938
Automobile Ash Receptacle for Smokers.... 733
Automobile Axle Housing, Jack Made from 131
Automobile Axle Repair, Emergency..... 976
Automobile Baby Bed Usable in the House. 411
Automobile, Baby Seat for, or Chair..... 766
Automobile, Bakery Rack for..... 287
Automobile Battery Used as Radio B-Battery 808
Automobile Bed for Tourists Fits Rear Seat 870
Automobile Boat, French, for Land or Water 881
Automobile Bobsled, Motorcycle Transformed Into 41
Automobile Bodies, Five, Covered Trucks Haul 713
Automobile Brake Bands, Fixture for Relining 619
Automobile Bus on Rails Replace Street Cars 855
Automobile Bus, 20 Passenger, Specially Designed 657
Automobile Carburetor Leakage, Stopping.. 455
Automobile Carburetors, Air Stabilizing Attachment for 895
Automobile, Chinese Prince Afraid to Ride in 78
Automobile Cigar Lighter, Spring Reel..... 80
Automobile Club Awards Good Roads Trophy 487
Automobile Clutch, Grabbing, Remedy for.. 634
Automobile Coffee Truck, Fire Department Operates 66
Automobile Compartment for Tire Chains.. 650
Automobile, Compass Mounted in Top of.... 164
Automobile Convertible for Sleeping..... 928
Automobile Crankcase Bolt Holder..... 138
Automobile Crankcase Oil, Meter Shows Viscosity of 380
Automobile Cylinder Heads, Clothespins Aid in Replacing 292
Automobile, Danger Sign Simulates 746
Automobile Dashboard Instrument Gives Warnings to Driver..... 198
Automobile Device Informs Driver Which Car Has Right of Way..... 577
Automobile Double Grip Socket Wrench.... 596
Automobile, Drawerlike Extra Seat for..... 202
Automobile, Drill Press Salesman Mounts Drill on 246
Automobile Driver, Reckless, Prize for Best Name for 980
Automobile Drivers, Feminine, Skirt Aid for 316

Automobile Driving at Night in Rain or Snow 958
Automobile Driving through Snow..... 133
Automobile Dumping Truck 261
Automobile, Elaborately Equipped, for Camping 862
Automobile Engine, Air Cooled, Has Novel Features 559
Automobile Engine Cylinders, Homemade Reaming Machine for..... 620
Automobile Engine Dismantled in Record Time 925
Automobile Engine Piston, Improved Design, Saves Oil and Gas..... 770
Automobile Engine Starting Made Easy with Carburetor Heating Device..... 534
Automobile Engine, Testing at the Muffler.. 949
Automobile Engines, Kerosene Mixing Chamber for 607
Antomobile, English, Has "Straight Eight" Motor 56
Automobile Exhaust Cleans Down Spout.... 145
Automobile Fan Belt, Slipping, Adhesive Tape Cures 481
Automobile Fenders, Bent, Press for Straightening 461
Automobile Ferried on Floored Scow..... 84
Automobile, First Japanese, Built to Meet Road Conditions 880
Automobile Garage, Basement, for Office Building Tenants 921
Automobile Gas Tanks, Self-Acting Filling Cap for 600
Automobile Gas Tanks, Suction Pumps Empty, before Shipping..... 78
Automobile Gaskets, Cork, Holder Protects 973
Automobile, German, Shaped Like Raindrop 690
Automobile Glove Has Flashlight in Back for Signaling 253
Automobile Headlight Glare Dimmer Protects Driver 41
Automobile Headlight Shield Aids Night Driving 894
Automobile Highway Signs, Richmond's, Warns and Invites..... 108
Automobile Highway Snow Shoveler..... 585
Automobile Hoist Replaces Repair Pit..... 529
Automobile "Home Fort" Plates Popular... 62
Automobile Hoods, Stand for Painting..... 615
Automobile Horn Gives Alarm When being Stolen 974
Automobile Hotels, by H. H. Windsor..... 29
Automobile Ignition, Secondary Condenser Improves 748
Automobile Ignition System Kept Dry with Newspaper 641
Automobile Ignition Tester 288
Automobile is Folded Wing Biplane..... 164
Automobile Jack and Rim Contractor Combined 911
Automobile Jack, Automatic, Controlled from Driver's Seat..... 696
Automobile Lamp, Antidazzle, Gives Perfect Light 443
Automobile, Lamp Post Crashes Through Top of 547
Automobile Locker for Tools and Tire in Rear of Body..... 194
Automobile, Low Priced, High Class Ignition System for 764
Automobile, Luxurious, for Indian Royalty. 41
Automobile Made by School Students..... 926
Automobile Made into Fire Engine by Installation of High Speed Turbine Pump... 677
Automobile Manifold Heater, Electric..... 266
Automobile—Motor Bus, Chicago, Nearly Equals Street Car..... 680
Automobile—Motor Bus, Pacific Coast, Seats Forty 375
Automobile Motor Busses for Highway Transportation, by A. H. Lane..... 176
Automobile Motor Busses, Tilting Test Proves Safety of..... 392
Automobile, Movie, Propelled by Dog..... 609
Automobile Mudhooks Made from Hinges... 909
Automobile Oil Dispenser is Quick and Accurate 119
Automobile Oil Testing Instrument..... 365
Automobile Owners, "Repair It Now" Campaign for 816
Automobile Paint Removing Machine..... 900
Automobile Painting, Dust Preventing Hints for 314
Automobile Parking Lamp, Red and White. 342
Automobile Parking Restriction Signs in San Francisco, Calif. 268
Automobile Propels Scowlike Vessel..... 113
Automobile Pulled Out of Sand or Mud with Shod Plank 647
Automobile Race, Slow, is Novel Test..... 54
Automobile Races, Fourth Annual Pike's Peak, Announcement of 979
Automobile, Racing, Three-Mile-a-Minute Reached by 844
Automobile Radiator Cap and Thermometer Locking Device 193
Automobile Radiator Cap, Locking the..... 317
Automobile Radiator Filling Bucket, Improvised 637
Automobile Radiator Fins, Bent, Tool for Straightening 252
Automobile Radiator Truss is Cheap and Easy Repair 433
Automobile Radiator Warmer, Electric, Prevents Water Freezing..... 578
Automobile Radiators, Condenser for..... 798
Automobile Radiators, Old Valves as Plugs for Testing 298
Automobile Rear Headlight for Backing.... 218
Automobile Repairing, Adjustable Creeper for 520
Automobile Rims, Demountable, Stopping Noise of 479
Automobile Road Map, Moving, Operated by Speedometer 523
Automobile Running Board Cage for Hunting Dogs 171
Automobile Running Board, Golf Bag Holder Clamps to 175
Automobile Seat, Auxiliary, for Child..... 299
Automobile Seat Made More Comfortable... 797
Automobile Serving Table Stands on Running Board 858
Automobile Show in China Housed in Bamboo Shed 738
Automobile Signal Has Penetrating Light.. 340
Automobile Signal, New, Gives Warnings of Movements 215
Automobile, Simple Rear Signal for..... 306
Automobile, Soap Dish as Fitting for..... 155
Automobile Spare Tire Brackets..... 469
Automobile Spare Wire or Disk Wheel Lock 74
Automobile Speaks for Itself with Aid of Amplifier 25
Automobile, Special Racing, Has Narrow Body 704
Automobile, Specially Designed, for Carrying Fox Hounds..... 887
Automobile Speedometer Changed to Make Soil Surveys 874
Automobile Spotlight and Control for Closed or Open Cars..... 279
Automobile Spring Hanger Bolts, Jack for Replacing 484
Automobile Spring Spreader and Tire Remover Combined 484
Automobile Springs, Pliant Metal Cover for 933
Automobile, Steam, Similar to Gasoline Car 693
Automobile Steering Wheel Muff..... 158
Automobile Stop Signal, Simple and Practical 342
Automobile Street Danger Signal for Day or Night Use 584
Automobile Street Sweeper and Sprinkler, Three Wheeled 550
Automobile Strikes Gas Causing Explosion and Fire 505
Automobile Submerged in Lake Six Months Has Fully Inflated Tires..... 366
Automobile Tail Lamp Made of Heavy Construction 918
Automobile Theft, Mousetrap Connected to Horn Prevents 473
Automobile, Three Wheeled, for Delivery Purposes 496
Automobile Timer Has Only Two Wires.... 871
Automobile Tire Chains, Emergency..... 813
Automobile Tire Pump and Radiator Fan Combination 166
Automobile Tire Pump, Revolving Cylinder. 383
Automobile Tire Rope Replaces Chains..... 891
Automobile Tire Valves, Dust Proof Rubber Cap for 367
Automobile Tires, Corrugated Rubber Tubes for 869
Automobile Tires, Threadless Dust Cap for. 768

Automobile Tires, Worn Out, Used to Build Fence 901
Automobile Touring Berths Add to Comfort 75
Automobile Touring, Elaborate House for.. 160
Automobile—Touring Truck, Taffy Making and Movies on 425
Automobile Tourists, Bungalette Camp for, by John Anson Ford 416
Automobile Tourists, Camping Cabins for, at Fergus Falls, Minnesota 109
Automobile Tourists, Comfort Station for, at Mason City, Iowa 598
Automobile Tourists, Garage and Apartment for 918
Automobile Towing Tongue Steers Automatically 739
Automobile, Toy, Hundreds of Ball Bearings Used to Make 533
Automobile, Tractor Tread, for Travel Over Snow 749
Automobile Trailer for Transporting Horses 43
Automobile Transmission Springs, Tool for Clamping 287
Automobile Transportation Poem, Prize Offered for 979
Automobile Trouble Lamp Mounted on Clothespin 970
Automobile Truck, Elevating End Gate Attached to 877
Automobile—Truck, Gas Producer on, Uses Charcoal as Fuel 576
Automobile—Truck Handles Aggregates Efficiently 107
Automobile Truck Railroad on Hetch Hetchy Line 419
Automobile — Truck, Runaway, Demolishes Army Barracks 885
Automobile Truck, Six Wheel Drive, Pulls Highway Train 745
Automobile—Truck, Telephone Repair, with Novel Features 68
Automobile Trucks, Armored, for Transporting Mail in Cities 514
Automobile Universals, Tool for Inserting.. 133
Automobile Washing Bucket Saves Soap and Varnish 765
Automobile Watch Carrier Made of Wire... 932
Automobile Water Pail, Inner Tube as..... 144
Automobile Whistle Plays Tune Any Pitch. 822
Automobile Windshield Cleaner Connected to Engine Manifold 934
Automobile Wire Wheels, Removing Tight Nuts from 314
Automobile Wood Sawing Machine Proves Profitable 411
Automobiles, American, Haitian Street Cars Built from 727
Automobiles, Chicago Private, Fire Engine Red Prohibited on 238
Automobiles, Disabled, Combined Trailer and Crane Handles 753
Automobiles—Flivvers or Fertilizer, by H. H. Windsor 519
Automobiles Give Road Test in Garage.... 73
Automobiles, New European, Novel Features of 88
Automobiles, New Shock Absorber for..... 610
Automobiles, Police, Identified by Special Marks 536
Automboiles, Safety Light Signal Code for.. 593
Automobiles, Steel Knot Tow Rope for..... 610
Automobiles—Trucks, Glass Lined Tank, for Transporting Milk 6
Automobiles, Wrist Meter for Locating Electrical Faults of 328
Aviation Field, $2,000,000, Recently Completed 250
Awards, Athletic, Standardization of, in Colleges Advocated 816
Ax Head, Copper and Zinc, Relic of Ancient Inca Indians 743
Ax, Steam Operated, for Chopping Redwood 906
Axle Housing, Jack Made from..... 131
Axle Repair, Emergency Automobile..... 976
Axles, Roller Bearing, on Railroad Cars.... 42

Baby Bathtub, Collapsible, Has Adjustable Dressing Table and Safety Belt..... 272
Baby Bed, Auto, Usable in the House..... 411
Baby Carriage, Extra Seat for..... 643
Baby Carriage, Gas Pipe Sleigh Runners for 313
Baby Clothes Hangers, Notched Pole for Holding 114
Baby Crib Also Contains Wardrobe..... 438
Baby Kiddie Car Teaches Child to Walk.... 281
Baby Play Pen, How to Make..... 811
Baby Seat for Chair or Automobile..... 766
Baby Swing, Folding 931
Backrest, Comfortable Outing..... 565
Bacteria in the Mouth, Why Generally Harmless 771
Bacteria, New Strategies Employed in War on 190
Bag Holder, Golf, Clamps to Auto Running Board 175
Bag, Shopping, Can be Folded to Size of Handbag 602
Bag, Traveling, Has Compartment with Toilet Articles 766
Bags, Paper, for Protecting Early Plants... 637
Bags Quickly Placed Over Clothing..... 958
Bait, for Salt Water Fish..... 970
Bakery Rack for Touring Car..... 287
Balancing Polishing Wheels..... 787
Baler and Thresher Combined Saves Time and Money 732
Ball Bearing Puller 463
Ball Bearings, Toy Auto Made of..... 533
Ball, Check Valve, Magnet Used for Removing 295
Ball Check Valve Seats, Grinding..... 301
Ball Pushing Game with Water..... 62
Ball, Rubber, as Faucet Guard for Dishwashing 972
Ball Valve, Automatic, of Extreme Simplicity 881
Ballet, Movie, Soap Bubble Scene for..... 339
Balloon Control, Teaching to Observers, by Frank B. Howe..... 225
Balloon Flight Teaches Valuable Lesson... 560
Balloon, Helium Inflated, First Flight of.... 230
Balloon Messages, Wireless Telephone, Sent Successfully 230
Balloon, Toy, as Advertising Novelty..... 144
Balloon Victims, "Roma," Last Rites for.... 754
Balloons, Electrically Wound Clock for.... 122
Balloons, Gas Filled Toy, Declared Fire Menace 683
Balls, Bowling, Retarder for..... 317
Balls, Lifting Check Valve..... 459
Bamboo Shed, Auto Show in China Housed in 738
Banana Industry, Pacific Coast of Guatemala to Have..... 756
Band Saws, Window Box Aids in Filing.... 302
Band Stand, Acoustic Properties of, in Library Park, Phoenix, Arizona..... 108
Banding, Motor Generator, Driving Unit for 455
Bandits, Revolving Safety Door Foils..... 221
Banjo Muting 319
Banjo Resonator Amplifies Its Volume Snappily 932
Banjo Throws Sound Forward..... 162
Bank, Home Savings, Combined in Desk Watch 890
Bank, Los Angeles, Largest Real Check Cashed by 596
Bank—Paying Tellers, Revolving Safety Door for 221
Bank Vaults, Safety Deposit, Building, by T. Benjamin Faucett 376
Banking Machine, Automatic, Vends Stamps 437
Barge, Anchored, is Boon to Anglers..... 48
Barge, Gigantic, for Mississippi River Shipping 48
Barge, Runaway, Wrecks Amusement Pier. 555
Barge System for Shipping Groceries..... 98
Barges Carry Pittsburgh Steel to Cincinnati 208
Bark, Mitsumata, Japs Make Leather from. 861
Bark, Rustic Flower Vase Made from..... 977
Bark, Wattle, and Wood to be Made into Wrapping Paper 842
Barn, Cattle, Huge Exhibition Building Used for 579
Barn, Horseshoe Shaped, on Missouri Farm. 104
Barns, Railroad Sheep, of Large Capacity.. 429
Barracks, Army, Runaway Truck Demolishes 885
Barrel, Gun, Polishing Bore of..... 472
Barrel Lining Paper, Crimped Two-Ply..... 118
Barrel, Tumbling, Automatic Stop for..... 450
Barriers, Tide, Seaweed Collected by..... 90
Bars, Working Heated 453
Bascule Bridge Rolls Backward When Opening 377
Base, Concrete, for Mail Box..... 647
Baseball Game Called on Account of Alaskan Tide 552

Baseball Game, Indoor 642
Baseball, Indoor, with Penknife 146
Baseball Scene, Wood, Whittled with Knife. 254
Basement Garage for Office Building Tenants 921
Bases, Cement Lantern 297
Bases, Concrete Derrick, in Texas Oil Fields 82
Basket Ball Mask Protects Eyes 597
Basket, Huge, at Flower Show Entrance 238
Basket, Refrigerator, for Picnics 930
Basket, Sewing, Trench Helmet as 148
Batch Box Train, Motor Truck Transports. 242
Bath, Bird, of Simple Design 970
Bath Cabinet, Folding Electric 233
Bathers, Hand Propelled Boat for 594
Bathers Protected by Fool Proof Seawall ... 47
Bathhouse, Canvas, is Easy to Erect and Carry 110
Bathing Beach, Shower Sprinkler on 435
Bathing Shoes that Snap on in Back 603
Bathing Support, Nonswimmers, Made in Animal Form 879
Bathroom, Toilet Cabinet for 931
Bathtub, Baby's Collapsible, Has Adjustable Dressing Table and Safety Belt 272
Bathtub, Water Aerating Apparatus for 60
Batteries, Flashlight, Using Cheap 470
Batteries, Repairing Storage 814
Batteries, Storage, Electrically Heated Knife for Repairing 826
Batteries, Storage, Testing Height of Electrolyte in 321
Batteries, Tools for Repairing 440
Battery, Auto, Used as Radio B-Battery ... 808
Battery Post, Broken, Repair for 473
Battery Service Station Aid 139
Battery, Small Motor Mounted on 974
Battery Terminal Scraper 287
Battery Terminals, Preventing Corrosion of 648
Battery Voltage Reverses at Low Temperatures 242
Battleship Crate, President's Turkey Shipped in 414
Battleship Decorated in Honor of Commander 548
Battleship, Giant, Converted into Floating Crane 666
Battleship "Mutsu," Latest Japanese 203
Battleships, Thirty-six, Moored at One Pier. 25
Battleships, U. S. Navy, Scrapping, by H. T. Layton 835
Beach, Bathing, Shower Sprinkler on 435
Beach Blocks Buried in Sand, Prizes for 120
Beach, Sixty Mile, as Tractor Route 896
Beacon—Lighthouse for Guiding Air Liners, by Everett J. Lovett 670
Beacon Lights on Mississippi River, by Lewis R. Freeman 847
Beading Tool, Flue, Rubber Retaining Ring on 757
Beads Carved from Walrus Ivory 761
Beam Compass, Substitute for 630
Beanpot, Glass, for Baking 603
Beans, Planting Dwarf Varieties of 797
Bear Cubs, Newly Born 608
Bearing Axles, Roller, on Railroad Cars 42
Bearing Bushings, Renewed without Displacement 938
Bearing Making for Model Machinery 320
Bearing, Propeller, for Airplane Model 646
Bearings, Ball, Toy Automobile Made of 533
Bearings, Hot, Ammonia for Cooling 286
Bearings, Staggered Roller, for Heavy Duty 750
Beater, Potato, Slotted Bar 767
Beater, Water Power Egg, Fits Any Faucet 766
Bed and Table in One for Small Apartments 185
Bed, Auto Baby, Usable in the House 411
Bed—Berths, Automobile Touring, Add to Comfort 75
Bed, Chair, Bookshelf, and Medicine Cabinet in One 201
Bed—Cot, Portable, Made from Two Folding Chairs 112
Bed, Folding, Also Contains Wardrobe 603
Bed Light, Convenient 321
Bed Making Contest for Hotel Chambermaids 858
Bed, Tourists' Folding, Fits Rear Auto Seat 870
Beds, War Department Supplies, for Forest Service 749
Bedstead Shelf for Sick Room 971
Beehive Gate Passes One Bee at a Time 723
Beehives, Scale Registers Weight of 542
Bees—Hornets, Driving from Nest 810
Bell Center, Improved 941
Bell, Farm, Placed on Windmill 797
Bell Tones, New American, Equals Old European Ones 380
Bell Warns Trucks Loaded Too High to Pass Door 270
Bells, Church, Demonstrated Over Telephone 716
Bells, Shells Replace on German Churches .. 446
Belt, Cleaning of Oil 625
Belt, Emergency Fan 286
Belt Fasteners as Pinch Dogs 293
Belt Guide, New Form of, for Long Belts ... 879
Belt, Life Saving, Adopted by Bootleggers .. 829
Belt, Long Carbon Steel, of Extreme Flexibility 580
Belt, New Type Leather, Prevents Slipping. 880
Belt Pulleys, Silent Chain Sprockets as 782
Belt Shifter, Automatic, for Grinder 942
Belt, Smoothing, Aids in Building Concrete Roads 882
Belt, Thresher, Wound by Power 791
Belts, Conveyor, Speed of 138
Belts, Emery, Prolonging Life of 946
Belts, Grain Side of for Running on Pulleys 948
Belts, Slipping Fan, Adhesive Tape Cures ... 481
Bench Lathe, Six Inch, Castings for 131
Bench Saw, Portable, Cuts Miters Any Angle 933
Bench Stop, Adjustable 460
Bending Fixture, Snap Ring 133
Bending Large Sheets of Metal 139
Berry — Blueberry Experiments Give Remarkable Results 752
Berry Picking Made Easy 962
Berths, Automobile Touring, Add to Comfort 75
Beverage, Carbonated, Effervescent Milk Produced as 760
Bicycle Grinding Outfit Has Many Features. 303
Bicycle Quickly Changed to Wagon 281
Bicycle, Trailer for 811
Bicycle, 30 Year Old, Has Wooden Frame ... 700
Bilge Stations to Prevent Pollution of Harbors 166
Bill, Our War, by H. H. Windsor 27
Billiards, National Association to Encourage 652
Binders, Filing Papers in 978
Biology—Organic Cells Reproduced from Inorganic Substances 367
Bird Bath of Simple Design 970
Birds and Animals, Wild, Photographing ... 633
Birds, Feeding Tray for 811
Birds—Geese, Wild, Killed in Electric Storm 75
Bison Fur to be Sheared as Substitute for Wool 407
Bits, Detachable, Quick Change Set of Tools Have 920
Blades, Safety Razor, as Filing Guard 449
Blankets, Short, Tucking in 635
Blasting, Cliff, to Change River Course 58
Bleaching Overprinted Blueprints 137
Blind and Deaf, Conversation Understood between 364
Blind and Deaf Converse by Different Methods 773
Blind and Deaf Cripple Operates Typewriter 673
Blind and Deaf Girl Develops Wonderful Sense of Touch and Smell, by Fred L. Holmes 13
Blind, Industrial Rehabilitation of, by Wm. A. McGarry 33
Blind Man, Bookmark Invented by 770
Blind, Traffic Whistles for, in Denver, Colo. 758
Blind, Typewriter Attachment to Assist 15
Blind Typists, Machine Makes Raised Letter Copy for 173
Blind Union Men Run Broom Factory 104
Blind War Veteran Writes Prize Winning Book 487
Block, Adjustable, for Hacksaw Vise 953
Blocks, Adjustable Parallel 299
Blocks, Concrete Building, Interlocking 604
Blocks, Concrete, Mold for Making 123
Blocks Found in Beach Sand Awarded Prizes 120
Blocks, Imitation Concrete, Made of Sandpaper 408
Blocks, Snow Building, How to Make 307
Blocks, White Cement, for Street Crossing Markers 885
Blood, Arterial, and Lungs Studied in the Andes 763
Blotting Paper Glued to Bric-a-Brac Prevents Scratches 812
Blower Reduces Cost of Concrete Aggregate 623

Blowpipe, Homemade Gas 614
Blowpipe, Soldering, Made from Incandescent Gas Lamp 958
Blowtorch and Soldering Iron Combined ... 935
Blowtorch, Automatic, Generates Own Pressure 218
Blueberry Experiments Give Remarkable Results 752
Blueprint Washer, Improved 460
Blueprints, Bleaching Overprinted 137
Blueprints for Notebooks, Making 631
Blueprints, Writing White on 793
Board, Cheap, for Large Drawings 466
Board, Copy Holding, Simple 600
Board, Ironing, Can be Clamped to Table .. 115
Board, Ironing, Small Apartment 158
Boat, Agrounded, Breeches Buoy Rescue Work from 543
Boat Air Ports, Improved, Have no Tumble Bolts 437
Boat Anchor, Old Propeller as 479
Boat—Barge, Anchored, is Boon to Anglers 48
Boat—Barge, Gigantic, for Mississippi River Shipping 57
Boat—Barge, Runaway, Wrecks Amusement Pier 555
Boat—Barge System for Shipping Groceries 98
Boat—Battleship Crate, President's Turkey Shipped in 414
Boat—Battleship Decorated in Honor of Commander 548
Boat—Battleship, Giant, Converted into Floating Crane 666
Boat—Battleship "Mutsu," Latest Japanese 203
Boat—Canoe on Wheels for Kiddies 937
Boat Carries Traffic Officer on Bowsprit 46
Boat, Challenger Fishing, Launching 698
Boat, Communication with from Telephone Booth 742
Boat, Concrete, Buried to Save Expense 747
Boat—Cruiser, French, Converted into Fish Drying Factory 260
Boat—Ferryboat, Large, Terrific Boiler Explosion on 865
Boat, French Automobile, for Land or Water 881
Boat, Hand Propelled, for Bathers 594
Boat Hulk, Wrecked, Imitated with Torch .. 380
Boat—Hydroglider, Speed and Comfort Feature, by Henry S. White 243
Boat, Ice, Building A, Part II—Spars, Rigging, and Assembling 152
Boat, Improved Stone 285
Boat Landings and Docks, Concrete, Making 467
Boat "Leviathan" Reconditioned as Finest Hotel Afloat 534
Boat—Lifeboat Inventor, Centenary of the Death of 116
Boat—Lifeboat, Motor, of Unusual Characteristics 673
Boat—Lifeboat, Releasing Gear on, is Safety Device 271
Boat—Motorboat and Auto in One 183
Boat—Motorboat Drawn Over Snow by Tractor 697
Boat—Motorboat, Small, Reversing Device for 579
Boat, Old Mississippi, as Power Plant 406
Boat "Quest," Commander of, Dies After Twenty Years of Adventure 507
Boat "Quest" Sails for Rio De Janeiro 430
Boat Rudder, Expanding, Acts Like Emergency Brake 119
Boat Rudder for Shoal Water 978
Boat, Sail, Made of Paper 279
Boat—Schooner "Bluenose," Canadian, Wins Race 39
Boat—Schooner "Maud" to be Used in North Pole Expedition 875
Boat—Scow, Floored, as Auto Ferry 84
Boat—Ship Portholes, Circular, Frameless Windows Replace 700
Boat—Ship, Twin Screw, Largest All-American-Made 173
Boat—Ship U. S. S. "Maryland," Speediest Electrically Driven 22
Boat—Ship U. S. S. "Memphis," Wreck of, Little Affected by Five Years' Storms 97
Boat, Single Deck, Converted into Oil Tanker 56
Boat, Smugglers, Has Clever Dumping Device, by Lawrence Wm. Pedrose 391
Boat—Steamer "All America" Has Up-to-Date Equipment 4
Boat—Submarine Power Plant to Give 10,000 Mile Radius 102
Boat—Submarine, Raising a Sunken 194
Boat Telltale, Automatic, Tells Direction of Engine 282
Boat, Toy, Spring Propelled 646
Boat Ventilator Cowl, Improved, Preserves Cargoes 366
Boat—Vessel, Scowlike, Automobile Propels 113
Boat—Water Walking Machine 222
Boats, Airplane Arresting Tackle for Use on 508
Boats, American, Carry Imports of Egyptian Cotton 196
Boats—Barges Carry Pittsburgh Steel to Cincinnati 208
Boats, Concrete, with Floating Iron Shell being Experimentally Built in Germany .. 688
Boat's Course, Instrument Draws on Chart. 739
Boats—Destroyers, Thirty Six, Moored at One Pier 25
Boats, Eskimo Whaling, are American Built 721
Boats, Fire Regulations Safeguarding 118
Boats, German Merchant, Enormous Growth of 206
Boats Hauled from One Lake to Another ... 806
Boats, Ice, Rival Speed of Hydrogliders 490
Boats, Naval, Government Saves Fuel Oil on 764
Boats, Radio News Service for, Relating to Derelicts, Floating Wreckage, Misplaced Mines, Buoys, Ice, etc 59
Boats, Sardine Fishing, Increase in Number and Efficiency 245
Boats—Ships, Copper-Sheathed, Menace Iron Ones 917
Boats—Steamers, Passenger, Portable Altars Installed on 716
Boats—Submarine Hulls, German, Converted into Tankships 355
Boats Used by Spinach Pickers on Large Chinese Marshes 678
Boats—Warships to be Converted into Breakwater 768
Boats—Warships, U. S. Navy, Scrapping, by H. G. Layton 835
Boats, Wooden Hulls of, for Pontoon Bridge 565
Boats, Wrecked, Salvaged with Pontoons ... 341
Bobsled, Auto, Motorcycle Transformed into 41
Bobsled, Motorcycle, How to Make 474
Bobsled Snow Sprinkler Makes Roads Icy for Logging 430
Bodies, Five Auto, Covered Trucks Haul 713
Body, Elaborate Auto, for Touring 160
Boiler Burners, Oil Field, Efficiency Test for 551
Boiler Compound Feeder, Steam 142
Boiler, Electric Steam, Economically Operated 594
Boiler Explosion, Terrific, on Large Ferryboat 865
Boiler Feed Water should be Preheated 627
Boiler Setting 295
Boiler, Small Steam, Electrically Heated 975
Boiler, 60 Foot, Social Luncheon Served in .. 246
Boilers, Action of Grease in 615
Boilers, Steam, Average Coal Consumption in 780
Boll Rot, Cotton Seed Treatment Eliminates 886
Boll Worm Disinfecting Chamber for Freight, by S. R. Winters 595
Bolt, Artificial Lightning, Realistically Produced 681
Bolt Circles, Marking 450
Bolt Cutter, Small, How to Make 787
Bolt Holder, Auto Crankcase 138
Bolt, "Set," Removing a 139
Bolts, Auto Spring Hanger, Jack for Replacing 484
Bolts, Carriage, Holder for 947
Bolts, Cylinder Head, Wrench for 448
Bolts, Removing Frozen 297
Bolts, Shingle, Automatic Aerial Conveyor for 860
Bones, Extra, Mistaken for Broken Ones ... 2
Bones, Prehistoric Human, of New Type Discovered 190
Book Ends, Self-Adjusting 799
Book, Loose-Leaf Note, Pocket for 126
Book, Prize Winning, Blind War Veteran Writes 487
Bookbinding Clamp, Lineman's Wire Connector as 319
Bookholder, School Desk, Made of Bent Iron Wire 692
Bookmark, Inexpensive, Pasted Inside Cover 760
Bookmark, Practical 308

Bookmark, Practical, Invented by Blind Man 770
Books, Walking, Advertise Free Public Library 847
Bookshelf, Bed, Chair, and Medicine Cabinet in One 201
Booster Casings, Workman Awarded Medal for Invention of 487
Boot, Childrens' Rubber, Slips Over Shoes 273
Boot Scraper, Wire 304
Boot, Shackle, Prevents Escape of Criminals 525
Bootblack Stand Equipped with Wireless Telephone 859
Bootblack Stand, Roller Shade on 724
Booth, Box Car, Made of Potatoes in Wisconsin Exhibit 926
Booth—Express Office, Portable (see Office)
Booth, Portable Lunch, on Ice Skating Rink 499
Bootleggers, Life Saving Belt Adopted by 829
Bootlegger's Trick Can for Swindling Customers 903
Borer, Insect Corn, Investigate Migration of 908
Borneo Inhabitants Eat Flesh of Crocodiles 752
Bottle and Glass Washer, Electric 36
Bottle Attachment for Pouring Liquids 157
Bottle Cap Remover and Can Opener in One 931
Bottle Caps as Metal Lath 471
Bottle Carrier, Milk, Handy 796
Bottle, Corked, as Float 485
Bottle, Extracting Cork from 797
Bottle Oil Dispenser Is Quick and Accurate 119
Bottle, Sanitary Toothbrush 115
Bottle Washer, Filter, and Drinking Fountain Contained in Faucet Attachment 115
Boulders Give Forth Music 110
Boulevard Trees in Salt Lake City Protected by Signs 269
Bowl, Wash, Traveler's Portable Rubber 690
Bowling Balls, Retarder for 317
Box Car Booth in Wisconsin Exhibit Made of Potatoes 926
Box, Cardboard Egg, for Shipping 862
Box, Chicken Feed, Handy 644
Box, Core, Hacksaw as Facing on 942
Box, First Aid, Installed on Busy Berlin Street 354
Box Keeps Brushes Safe and Clean 549
Box Kite, Steeplejack Climbs Chimney with Aid of 214
Box Lid, Secret, How to Make 962
Box, Magic Pill 315
Box, Mail, Combination Lock 600
Box, Mail, Concrete Base for 647
Box, Metal, Protects Extra Inner Tubes 119
Box, Neat, for Sending Tokens of Friendship 868
Box, Stuffing, Repairing Worn 627
Box, Window, Aids in Filing Band Saws 302
Boxes, Steel Stock, Rack for 792
Boy and Dog Make Coast to Coast Trip on Horseback 280
Boy, Injured, Firemen Donate Artificial Leg to 608
Boy Scout Fireplace for Study of Geology 94
Boy Scout Pushball Game in San Diego, Calif. 280
Brackets for Spare Tire 469
Braden, Frank: Animal Training Behind the Guard Ropes 705
Brake Band Rivets, Cold Chisel Improvised for Cutting 294
Brake Bands, Fixture for Relining 619
Brake, Emergency, Expanding Rudder Is 119
Brake, High Power Staff, for Freight and Passenger Cars 736
Brake Lining Fixture, Handy 131
Brake or Clutch, Fuller's Earth for 804
Brake Rod Slack Adjuster, Automatic 891
Brake, Wagon Coaster, Easily Renewed 650
Brake, Wagon, Mountain Type 482
Brass and Copper, Galvanizing 301
Brass Furnace, Electric, Revolving Mold Table on 386
Brass Parts, Cleaning 630
Brazed Joints, Making Good 464
Brazier, Charcoal, Trench Helmet as 148
Brazing and Welding Clamp for Tees 777
Bread and Cake Cooling Screen 766
Breakwater, Warships to be Converted into 768
Breast Drill Aided with Tap Wrench 132
Breeches Buoy Line, Rescue Work from Agrounded Ship with 543
Brick Paving Serves Well During Long Period 750
Bricks Made from Oil Shale 330
Brickwork Joints, Mortar Cutting Machine for 196
Bridge Arch Erected in Twenty-five Days 81
Bridge, Arched School, as Memorial to War Veterans 926
Bridge, Bascule, Rolls Backword When Opening 377
Bridge, Concrete, to Cross Southern River Swamps 98
Bridge Construction, Bronze for Weatherproofing 194
Bridge Construction in a Treacherous Mexican River 384
Bridge, Crude Albanian, Built of Wood 760
Bridge, Delaware River, New, by Robert F. Salade 555
Bridge, Float, Aids in Building Concrete Roads 882
Bridge, Huge International, Across Detroit River 523
Bridge Models Show Drafting Problems Clearly 293
Bridge, New Chicago, Clever Engineering in Opening 191
Bridge, New Steel, to Cross Columbia River 828
Bridge Playing, New Cards Make, of Skill Only 440
Bridge, Pontoon, Hulls of Wooden Ships for 565
Bridge Span, Huge Concrete, Fire Causes Fall of 908
Bridge, Suspended, Carries Traffic Across English River 60
Bridge, Suspended Foot, Made of Old Telegraph Cables 63
Bridge, Suspension, Located at New Carlisle, Ohio Instead of Winchester, Ky 324
Bridge Taken to Repair Shop by Floating Crane 15
Bridge, Toll, New Viaduct Replaces 656
Bridge, Two-Span Railroad, Over River in Washington 924
Bridge, Y-Shaped Three-Way, Crosses Two Streams 26
Bridges, All Size Concrete, Collapsible All Steel Form for 551
Bridging Condenser, Adjustable Wireless 319
Briggs, C. A.:
Level, Precision, Practical Value of 207
Quartz Crystals Furnish Standard for High Temperatures 324
Saturn's Rings Will be Dispersed by Its Satellites 488
Sounds Measure Feeble Electric Currents 488
Tides Responsible for Present Life Forms 324
Briquettes, Coal Dust, Solve French Railway Problem 378
Bristol, Jack A.: Motion Picture Film Prepared on Fast Moving Train 420
Broach, Hole for, should be Drilled or Bored 955
Broach, Keyway Re-Dressing 624
Broach, Round, Holes Accurately Sized with 135
Broaches, Lubricating 459
Broiler, Dripless, Keeps Stove Clean 439
Bronze for Weatherproofing Bridge Construction 194
Bronze Statue of Famous Horse 101
Bronze Tower, Ornamental, for Memorial Chapel 78
Brood Coop, Adjustable Front for 472
Broom Factory, Blind Union Men Run 104
Broom Holder Made from Shoehorn 317
Brush, Electric Vacuum, for Dusting 115
Brush, Electrically Driven, for Bottle Washing 36
Brush for Cleaning Refrigerator Drain Pipe 439
Brush for Removing Refuse from Gutters 796
Brush Holder, Calciminer's 137
Brush Hook Made from Shovel 976
Brush Plow, Tractor Drawn, for Land Clearing 864
Brushes, Paint, Box for Preserving 549
Brushes, Sectional Buffing, with Interlocking Plates 425
Bubble Scene, Soap, for Movie Ballet 339
Bubbles, Soap, Used to Study Explosion of Gases 910
Bucket, Auto Washing, Saves Soap and Varnish 765
Bucket, Improvised, for Getting Water from Low Well 644
Bucket Mop Wringer 114
Bucket, Motorist's Water, Inner Tube as 144
Bucket, Radiator Filling, Improved 637

Buffalo Fur to be Sheared as Substitute for Wool 407
Buffing Brushes, Sectional, with Interlocking Plates 425
Buffing Device, Motor Driven, Also Drills and Grinds 568
Buggy Shafts, Milk Cart Made from 472
Building, Bamboo, Auto Show in China Housed in 738
Building—Barn, Horseshoe Shaped, on Missouri Farm 104
Building—Barracks, Army, Runaway Truck Demolishes 885
Building, Beautiful Fraternal, for Fort Wayne 743
Building Blocks, Interlocking Concrete 604
Building—Capitol, Old Washington, Given to Woman's Party 858
Building—Chapel, Ornamental Bronze Tower for 78
Building—Church, Abandoned, Utilized as Garage 886
Building—Church, Old, Near Wellsville, Pa., Attended Once a Year 268
Building—Church, Shreveport, Has Many Unusual Features, by Archie Richardson. 866
Building—City Hall, Philadelphia, Brilliant Illumination of 370
Building—Clubhouse, Granite, for Elk Motorists 109
Building Commemorates Discovery of Gold in California 434
Building—Courthouse, Old Log, in Independence, Mo., Still Used 269
Building, Crane Anchored in Wall of 226
Building, Frame for, Made of Tubing 422
Building, Giant Office, to be Built Around Old Dwarf Building 390
Building—Grain Elevator, Huge, to be Constructed at Montreal, Canada 589
Building—Hospital, Farthest North, Building the, by Lawrence Wm. Pedrose 49
Building—Hospital, World's Largest Fireproof 58
Building—Hotel, New Chicago, to Have Bungalows on Roof 914
Building—Hotel, New York Apartment, to House Church 731
Building—House Cut in Two to Meet House Shortage 365
Building—House Has Camouflage Furniture and Conveniences 258
Building—House, Moorish, Built Beside New York Hotel Is Novel Extension 218
Building—House, One Room, Has Rooms in Walls, by Frank B. Howe 209
Building, Huge Exhibition, Used for Cattle Barn 579
Building—Library, New, being Constructed at Louvain 820
Building Material, Study Standardization of 752
Building Material:
  Concrete Blocks, Interlocking 604
  Concrete Houses, Fireproof, Built Economically 676
  "Concrete Shooting" on House from Gun, by Cleveland Gaines 361
  Lumber, How Kauai Gets 729
  Lumber in Yard Handled by Electric Machinery 228
  Lumber, Yellow Poplar, Drying 972
  Roofing Material Tested in Exposure Parks 923
  Roofing, Prepared, Old Rags Used in Making 738
  Roofing, Sheet Metal, Cut with Handsaw .. 782
  Roofing, Roll-Changing Machine Used in Making 911
  Roofs, Pure Lead, not Durable 558
  Shingles, Interlocking Copper 528
  Shingles, 500,000 Cut by Mill per Day, by Henry C. Copeland 734
  Telephone Poles Used in Making House .. 542
  Weather Stripping of Wrapped Cotton Wicking 605
  Wood, Artificial Plastic, Resembles Real Timber 771
Building, Mosque, Only Mohammedan, in Western World 891
Building, Office, Has Basement Garage for Tenants 921
Building, Office Theater, Has Three First Floors 107
Building Perfectly Portrayed in Water 372
Building Progress Shown with Graphic Signboard 758
Building Regulations, Garage, Tested by Application 173
Building—Studio, Large Glass, Delicate Operation of Moving 561
Building—Temple, Mormon, Designed on Straight Lines 333
Building—Terminal, Chicago Mail, Equipped to Handle Big Tonnage 744
Building—Terminal, Municipal River, Erected at Nashville 737
Building—Theater Constructed in Three Sections 565
Building, Two Story Office, Moved by Motor Truck 717
Building—Union Station Foundation Tests, Astonishing Results of, by Henry S. White 653
Building Wrecked by Runaway Barge 555
Buildings—Apartment Houses to be Wired for Radiotelephones 738
Buildings, Community Center, at Isolated Power Plant, by Charles W. Geiger 888
Buildings—Houses, Concrete Fireproof, Built Economically 676
Buildings—Houses, Fort Wayne, Indiana Families Build Own 100
Buildings—Houses, 600, Built at "No Man's Land," France 935
Building's Roof is 510 Years Old and Still Good 53
Buildings—Shelters, Railroad Sheep, of Large Capacity 429
Buildings, Small Apartment, Steel Kitchens for 934
Buildings, Testing Vibration in 460
Buildings—Warehouses, Fireproof Cotton, Models Show 892
Bulletin Shows Progress of Football Games. 48
Bumper, Automatic, Prevents Collisions on Elevated Roads 522
Bungalow Camp for Auto Tourists, by John Anson Ford 416
Bungalow Furnishing, Prize Offered for 159
Bungalow, One Room, Has Rooms in Walls, by Frank B. Howe 209
Bungalows, New Chicago Hotel Roof to Have 914
Buoy, Nonswimmers, Made in Animal Form. 879
Bureau, "Built In," Saves Room Space 960
Bureau, Foreigner, Established in Minneapolis Post Office 276
Bureau Service, Weather, Saves Lives and Property 326
Burglar Alarm, Shooting Rat Trap as 482
Burglars, Shooting Device for Protection Against 818
Burial Caskets, Glass 82
Burial Vault Tested as Water Craft 62
Burner, Adjustable Height 904
Burner, Adjustable Height, Reduces Gas Consumption 498
Burner, Heavy Oil, for Small Heating Plans. 251
Burner, Novel, and Cast Iron Range Top on Gas Stove 588
Burners in Oil Field Boilers, Gas, Efficiency Test for 551
Burr Mill, Century Old, Still in Use 826
Bus, Motor, for Chicago Nearly Equals Street Car 680
Bus, Motor, for Highway Transportation, by A. H. Lane 176
Bus, Pacific Coast, Seats Forty 375
Bus, 20 Passenger Motor, Specially Designed 657
Bushing Jack, Wrist Pin, Prevents Distortion of Pistons 951
Bushings, Bearing, Renewed without Displacement 938
Bushings Removed with a Tap 293
Bushings, Sandpaper Used for 322
Busses, Motor, on Rails Replace Street Cars 855
Busses, Motor, Tilting Tests Show Safety of 392
Butter Made from Cocoanut Oil, by C. W. Geiger 262
Butter, Well Mixed Peanut, Machine Dispenses 442
Buttonhook, Cork Extractor Made from 474
Buttonhooks, Small Screwdrivers Made from 644
Buttons, Flexible Cuff, Allows Cuff to be Pulled up without Removing Links 273
Buyers, Training of, Public Taste Studied in 119
Buying at Home Encouraged by Simple Object Lesson 546

Buzzer, Electric, Sewing Machine Prospects Heralded by 550

Cabin, Californian Log, Artificial Icicles Adorn 545
Cabin, Hunting and Fishing, on Cedar River, Wash. 269
Cabinet, Bath, Folding Electric..... 233
Cabinet, Sanitary Vacuum, for Preserving Food 549
Cabinet, Toilet, for Bathroom..... 931
Cabins, Tourists' Camping, at Fergus Falls, Minnesota 109
Cable Ferry System Floats Ice across River. 192
Cable, New Telephone, Laid across Irish Channel 829
Cable Steamer "All America" Has Up-to-Date Equipment 4
Cable, Telephone, Contains 2,424 Wires.... 499
Cables, New Submarine, of Great Sending Capacity 362
Cables, Old Telegraph, Used to Build Foot Bridge 63
Cables, Simple Fair Leader for Guiding.... 383
Cableway, Aerial, Carries Tool Shed across River 493
Caddy, Tea, Also Measures..... 603
Cadets, Flying, Air Service Examinations to Appoint 979
Cafeteria, Yosemite Park, Popular with Tourists 261
Cage for Washing Windows..... 43
Cage, Hunting Dogs, on Auto Running Board 171
Caisson Sinker and Shaft Digging Machine. 98
Cake and Bread Cooling Screen..... 766
Cake Shell Pan, Aluminum, for Fruit Fillings 114
Cakes, 60 Pound Fruit, Presented to Famous Persons 236
Calciminer's Brush Holder..... 137
Calcium Chloride, Dissolving..... 793
Calcium, Metallic, Electrochemical Process for Manufacture of..... 900
Calculating Chart, Simple, for Figuring Pay Rolls 246
Calculator, Gasoline, Price and Quantity... 138
Caliper Has Scriber for Marking Centers... 932
Caliper, Thickness, of New Design..... 566
Calipers, Firm Joint, Lock for..... 452
Calipers, Scale Attachment for Setting..... 940
Calite Has Unusual Properties..... 554
Camel Control, Nevada Legislature Passes Law for 665
Camera Attachment for Slow Motion Pictures 363
Camera Attachment, Simple for Stereoscopic Views 865
Camera, Box, Safety Catch for..... 474
Camera, Folding, Focusing Attachment for 522
Camera for Determining Amount of Tar in Gas 686
Camera, Home Movie, Direct Positive..... 824
Camera, Hugh Electric, for Making Maps.. 343
Camera, Jewelers, Produces Exact Size Pictures 894
Camera Lens Hood Made from Drinking Cup 960
Camera, Long Range Movie, Photographs Shell Bursts 591
Camera Shutters should not be Oiled..... 650
Camera, Tiny French Plate, Built like Pistol 750
Camouflage Conveniences Characterize Modern House 258
Camp, Bungalette, for Auto Tourists, by John Anson Ford..... 416
Camp Chairs, Folding, Portable Cot Made from 112
Camp, Hunting and Fishing, on Cedar River, Wash. 269
Campers, Razor Strop for..... 804
Campers, Rigid Collapsible Tent Frame for. 604
Campfire Irons, Nails as..... 800
Camping Backrest, Comfortable..... 565
Camping Cabins, Tourists', at Fergus Falls, Minnesota 109
Camping, Elaborately Equipped Auto for.. 862
Can, Bootlegger's Trick, for Swindling Customers 903
Can Clamp, Safety Milk, Holds Lid Tight... 116
Can Opener and Bottle Cap Remover in One 931
Can Opener, Prepared Milk, Also Closes It. 600
Can, Steel Refuse, Made Ornamental..... 760
Can, Two Shell Garbage, Disinfects Refuse 277
Canal Aqueduct, Wooden, Replaced with Steel 757
Canal Bank Leakage, Crawfish Extermination Stops 253
Canal from North Sea to Baltic, Renew Proposal for 106
Canal Lining, Concrete, Sliding Steel Form for 535
Canal Revenue, Panama, for One Day..... 362
Canal Zone Quarters, Gas for Cooking being Installed in 730
Canals, Peculiar Pumping Machine for Emptying 408
Candidates, Political, Do Electioneering by Wireless 72
Candle and Flag, Magic Trick..... 156
Candle and Wreath, Electric, Minimize Fire Risk 218
Candy and Flowers, Neat Container for Sending 868
Candy Industry, Permanent Exposition for 78
Candy, Miniature House Made of..... 772
Cane, Kiddie Scooter Convertible into..... 120
Cane, Sugar, Harvesting Machine, by Robert Grimshaw 494
Canning Wastes, Experimental Purification of 928
Canning with Inert Gas for Various Food Products 720
Cannon, Two 16 Inch, Presented to Town of Plymouth 268
Canoe on Wheels for Kiddies..... 937
Cañon Walls Serve as Poles for Transmission Wires 820
Cans, Paint, Handy Convenience When Opening 961
Canvas Bathhouse is Easy to Erect and Carry 110
Cap, Dust-Proof Rubber, for Automobile Tire Valves 367
Cap, Electric, for Warming Cold Heads.... 41
Cap, Gas Tubing, Fits Any Size Hose Connection 363
Cap, Self-Acting Filling, for Auto Gas Tanks 600
Cap, Simple Stovepipe..... 318
Cap, Stovepipe, Trench Helmet as..... 148
Cap, Threadless Dust, for Auto Tires..... 768
Capitol, Old Washington, Given to Woman's Party 858
Caps, Bottle, as Metal Lath..... 471
Caps, Tight Fruit Jar, Removing..... 469
Capsules, Veterinary, for Small Parts..... 785
Car Dump, Automatic, Newly Designed..... 917
Car, Gasoline, for Combating Forest Fires. 566
Car, Lightweight Inspection for Railroads.. 544
Car, Monorail Dumping, for Use on Farms. 910
Carbide Lamp, Self-Cleaning, for Miners... 116
Carbide, Tractor Started with..... 288
Carbon Dioxide Measured by Electrical Indicator 76
Carbon Monoxide Poisoning, First Aid Treatment for 552
Carbon Paper as Typewriter Ribbon Substitute 157
Carboys, Acid, Rubber Trough for..... 141
Carburetor Heating Device Makes Auto Starting Easy 534
Carburetor Leakage, Stopping..... 455
Carburetors, Auto, Air Stabilizing Attachment for 895
Carburetors, Three, on French Engine..... 5
Card Trick, X-Ray..... 485
Cardboard Disk Cutting in the Lathe..... 788
Cards, New Playing, Make Bridge Game of Skill Only 440
Cards, Playing, Made Slick..... 157
Cards Teach Safety First to Country Road Pedestrians 122
Carfare Problem, Double, Ingenious System Solves 441
Carpenter Plane, Extension Attachment for 561
Carpet Stretcher, Screen Wire Pulled Taut with 976
Carriage, Baby, Extra Seat for..... 648
Carriage Bolt Holder..... 947
Carrier, Cardboard Egg, for Shipping..... 862
Carrier, Invalid, Removes Patient from Bed Painlessly 489
Carrier, Lawn Mower Grass, Works on New Principle 714

Carrier, Milk Bottle, Handy 796
Cars, Glass Lined Tank, for Transporting Milk 6
Cars, Wooden Railroad, Have Longer Life Than Steel 920
Cart, Milk, Made from Buggy Shafts 472
Cart, Push, for Children in Zoölogical Gardens 444
Carving, Sculpture, from Photographs 204
Carving, Skillful, Various Wood Articles Made by 547
Case Holds Tags Numerically 130
Case, Needle, Holds Different Size Needles .. 272
Case, Pen and Pencil, for School Children ... 609
Casein Glue, Copper Salts Increases Resistance to Moisture of 874
Cases of Maximum Strength, Making 125
Cases, Type, for Holding Small Parts 952
Cash Drawer and Adding Machine in One .. 352
Cash Register, Lightweight, Is Checking and Adding Machine 367
Casings, Booster, Workman Awarded Medal for Invention of 487
Casings, Porous Concrete, as Well Strainers 226
Caskets, Glass Burial 82
Caster Cup for Leveling Short Legged Furniture 768
Casting, Huge, Three Cranes Carry 247
Castings for Six Inch Bench Lathe 131
Castings, Special Sewer Cap, Making 619
Cat Laps Milk with Its Paw 609
Catch, Burglar-Proof Window, Locks Sash at Any Point 443
Catch, Safety, for Box Camera 474
Catch, Screen Door, Can be Securely Locked 569
Cathodes, Silver, Cleaning 448
Cats Are Good-Luck Mascots for Airplane .. 773
Cattle Barn, Huge Exhibition Building Used as 579
Cattle, Better Bred, Prizes for, Offered at Show 815
Cattle, Blooded, Identified by Nose Print ... 915
Cattle Food Made from Sawdust by Chemical Process 863
Caustic Soda Vapor, Fruit Peeling Machine Uses 726
Cave Entrance Mentioned in "Last of the Mohicans" 772
Cedar Forests, Dense Red, in British East Africa 764
Ceilings, Painted, Cleaning 315
Cellars, Combined Suction Ejector for Pumping Out 521
Cells, Organic, Reproduced from Inorganic Substances 367
Cement Bases for Lanterns 297
Cement, Eave Troughs Repaired with 976
Cement Filling in Decayed Trees 283
Cement, Furnace, Repairs Fireplace 645
Cement Shooting Gun for Coating Houses, by Cleveland Gaines 361
Cement Sidewalk Construction, Faults in .. 778
Cement Spray Gun, Rock Bursts in Metal Mines Experimentally Prevented with Use of 415
Cement Tennis Courts Laid with Permanent Lines 388
Cemetery, Old Abandoned, Made into Park. 927
Census to Show Exact Number of Safety Men in Mining Industry 652
Centenary of Death of Lifeboat Inventor .. 116
Center, Improved Bell 941
Center Marking on Shafts 300
Center Punch Attachment for Square 943
Centers, Improved, for Arbors 294
Centrifugal Force Machine Gun 389
Chain, Indoor Fern Trellis Made of 978
Chains, Emergency Tire 813
Chains, Tire, Compartment for 650
Chains, Wood, Made by Skillful Whittling. 547
Chair, Adjustable, for Workers 522
Chair, Baby Seat for, or Automobile 766
Chair, Bed, Bookshelf, and Medicine Cabinet in One 201
Chair Device Easily Adjusts Its Height 251
Chair, Double, for Golf or Garden 122
Chair, Rocking, Felt Tires for 642
Chairs and Table, White Enamel, for Children 445
Chairs, Folding, Portable Cot Made from ... 112
Chamber of Commerce Organized, Aeronautical 429
Chambermaids, Hotel, Bed Making Contest for 858
Channel Protected from Drifting Sand by Long Dike 558
Channel, Sewage, Made from Slough in Portland, Oregon 418
Chapel, Memorial, Ornamental Bronze Tower for 78
Charcoal as Fuel for Gas Producer on Truck 576
Charcoal Brazier, Trench Helmet as 148
Charm, Watch, Land Elevation of Nation Shown in 696
Chart, Practice, of Keyboard on Typesetting Machine 700
Chart, Simple, Rapid, for Figuring Pay Rolls 246
Chart, Weather, Used to Save Money When Placing Ties 696
Chase, Printer's, Simplifies Locking Up Forms 688
Check, Largest Real, Cashed by Los Angeles Bank 596
Check Protector on Pen Prevents Forgery .. 356
Check Valve, Ball, Made from Screw 617
Check Valve Ball, Magnet Used for Removing 295
Check Valve Balls, Lifting 459
Check Valve Seats, Ball, Grinding 301
Checkerboard, Inlaid, How to Make 483
Checkerboard Table Top, Inlaid, Made of Thousands of Pieces of Wood 915
Checking and Adding Machine, Lightweight Cash Register Is 367
Checking Machine Used in Handling Freight. 496
Chemical Action, Testing under Great Pressure 346
Chemical Association, New Organic 323
Chemical Crusher Made from Spoon 470
Chemical Heat, Iron Silicon Alloy Melted by 560
Chess Trick, Knight's Tour 648
Chicken Coop, Adjustable Front for 472
Chicken Feed Box, Handy 644
Chicken—Hen Mothers Little Ducklings 937
Chicken House Floor, Sanitary, Linoleum Makes 977
Chickens—Hens, Laying, Are Trapped in Automatic Nest 30
Chickens, Landing Net for Catching 635
Chickens, Little, Portable Pen for 959
Chickens Vaccinated Against Chicken Pox. 338
Children—Picture Story Department 120, 280, 444, 608, 772, 936
Children, Prams for, in Zoölogical Gardens. 444
Children, White Enamel Table and Chairs for 445
Children's Library Made of Green Shutters. 281
Children's Play Pen, How to Make 811
Children's Rubber Boots Slips over Shoes .. 273
Chimney Cap, Simple 318
Chimney, Clever Rescue Work of Workman Marooned on 162
Chimney Flue Hole Stop, Invisible Fireproof 917
Chimney in Two Sections Erected with Crane 182
Chimney, Steeplejack Climbs with Aid of Box Kite 214
Chimney, Worn Out Steel, Wrecking 718
Chimney Wrecked in 55 Minutes by New Method 277
Chimneys, Compressed Air Used to Clean .. 536
Chimneys, Concrete, Erected Rapidly 37
Chimpanzees Ride on Steam Engine 445
Chinese City, Walled, Modernizing A, by Francis Dickie 509
Chinese Merchants Start Irrigation Project. 217
Chinese Prince Afraid to Ride in Auto 78
Chip, Steel Lathe, 166 Feet Long 282
Chisel, Cold, Extension for 791
Chisel, Cold, Improvised for Cutting Brake Band Rivets 294
Chisels, Set of, for Use with Single Handle. 920
Chloride, Calcium, Dissolving 793
Chlorine Gas Used to Kill Bad Odors, by Harry A. Mount 219
Chuck, Drill, Ball Grip 618
Chuck, Magnetic, Nonmagnetic Materials Held on 947
Chuck, Quick Change, Soft Shearing Pin for 274
Chuck, Safety Drill and Tap, Protects Tools 748
Church, Abandoned, Utilized as a Garage .. 886
Church Bells Demonstrated over Telephone 716
Church Monument Unveiled in Paris to Victims of Bombardment 880

Church—Mosque, Only Mohammedan, in Western World 891
Church, New York Apartment Hotel to House 731
Church, Old, Near Wellsville, Pa., Attended Once a Year 268
Church, Shreveport, Has Many Unusual Features, by Archie Richardson 866
Church, Trinity, being Repaired in Paris 89
Church, Unusual Lighting Effects Produced in 823
Churches, German, Shells Replace Bells on 446
Chute, Gravity, for Stacking Hay 948
Chute, Inclosed Coal, Reduces Dust 354
Cigar Lighter, Spring Reel, for Autoists ... 80
Cigar Store Has Humidor Compartments for Customers 166
Cinders, Induced Draft Fan Aids Eliminating 591
Circles, Gauge for Dividing 627
Circles, Marking Bolt 450
Circus Animals, Training, by Frank Braden 705
Circus Elephant Has Wooden Leg as Added Attraction 868
Circus Parade Carved from Soap 445
Cistern Filters, Ordinary, Do Not Purify Water 38
Citrus Fruit, Treatment for, Makes Icing Unnecessary 704
City, Ancient, Excavations of, by R. P. Crawford 537
City — Armageddon Ruins, Ancient, to be Explored 565
City Beautiful, Plan for 601
City—Berlin Streets, 100,000 Volts Carried over 98
City Council, Philadelphia, Shown Motion Pictures 673
City Hall, Philadelphia, Brilliant Illumination of 370
City Mail, Armored Trucks for Transporting 514
City Plan, Ideal British, being Tried 542
City, Remote Workers', Has Modern Conveniences 593
City, Residential Part of, Damaged by Oil Gusher 887
City Streets, Simple Location System for .. 271
City Traffic, New York, Guided from One Center 431
City, Walled Chinese, Modernizing A, by Francis Dickie 509
City's Growth Shown by Wall Size Maps ... 265
Civic Achievement, Highly Efficient Musical Service Regarded as 979
Civic Features 108, 268, 434, 598, 926
Civil Service:
Computers, Two Examinations for 652
Instrument Makers, Examinations for 487
Clamp, Bookbinding, Lineman's Wire Connector as 319
Clamp, Drawing Board 295
Clamp for Making Square from Scales 137
Clamp for Welding and Brazing Tees 777
Clamp, Jig, Quickly Operated 943
Clamp, Rapid Jig, How to Make 794
Clamp, Safety Milkcan, Holds Lid Tight 116
Clamping Kink 613
Clamping Tool for Auto Transmission Springs 287
Clamping Work for Drilling 781
Clark, F. L.: Ice Harvesting, Railroad, in the Mississippi 373
Clay Digging Tool, Pneumatic 257
Clay Pit as Storage Place for Coal Screenings 241
Cleaner, Auto Windshield, Connected to Engine Manifold 934
Cleaner, Vacuum, Used to Cool Temperature of Room 970
Cleaning Machine Safely Cleans Small Machine Parts 584
Cleaning Machine, Wheat, for Use with Thresher 689
Cleaning Tarnished Silver 799
Cleansing Cream, Prizes Offered for Best Household Uses for 980
Climbing Irons, Improvised 961
Climbing Mount Rainier in Midwinter, by Lawrence Wm. Pedrose 713
Clinic, First City Radium, for Rich and Poor, by Douglas C. Miner 592
Clinics, Dental, in Schools Increasing 105
Clipper, Electric Hair, Has Motor Installed in Handle 394
Clips, Finger, for Oilcans 157
Clock, Alarm, Turns on Electric Lights 312
Clock, Desk, Home Savings Bank Combined in 890
Clock for Airplanes Is Electrically Wound .. 122
Clock, Hand Carved, Made Entirely of Wood 844
Clock, Time, System of Symbols Used on ... 40
Cloth—Wool Made Moth-proof by German Preparation 514
Clothes Hangers, Notched Pole for Holding 114
Clothes Protected from Moth and Dust by Rubber Tubing 248
Clothes—Uniforms, Messenger's, Company Cleans and Repairs 117
Clotheshorse, Folding, Bracing 157
Clothesline Fastener Easy to Operate 767
Clotheslines, Rope, Waterproofing 151
Clothespin, Auto Trouble Lamp Mounted on 970
Clothespins Aid in Replacing Auto Cylinder Heads 292
Clothing, Bags Quickly Placed over 958
Clothing of French Modiste Marked to Prevent Counterfeiting 440
Club, Hoosier Ton Litter, Aids Indiana Farmers 652
Club Meeting, Boosters', Called to Order by Horn 242
Clubhouse, Granite, for Elk Motorists 109
Clutch, Grabbing, Remedy for 634
Clutch or Brake, Fuller's Earth for 804
Clutch Shifter Made to Stay "Put" 955
Coal, Alaskan, Assumes Commercial Importance, by Lawrence Wm. Pedrose 562
Coal Bill, Railroad, Reduced by Constant Reminders 66
Coal Chute, Inclosed, Reduces Dust 354
Coal, Cleaning by Flotation Process 916
Coal Consumption, Average, in Steam Boilers 780
Coal Converted into Gas at Mines to Solve City Fuel Problems 818
Coal Dust Briquettes Solve French Railway Problem 378
Coal Handling Plant at New Orleans, New .. 215
Coal, Low Grade, to Produce Electric Power with 830
Coal Mine, Automatic Substation in 264
Coal Mine Fatalities for 1921 504
Coal Mine Props, Tree Planting for 418
Coal Mine Tipple Serves Two Mines through Long Conveyor 266
Coal Mining Machine Cuts, Breaks, and Loads in One Operation, by Everett J. Lovett 337
Coal Production, 1921, Enormous Decrease in 104
Coal Recovered from Cinders by Magnetic Process 718
Coal Screenings Stored in Old Clay Pit 241
Coal Tar Products, Two New Dyes Discovered in 770
Coal, Unmixed Sarre Basin, Metallurgical Coke Produced from 341
Coal, Waste, Effective Process for Reclaiming 174
Coal, Weighted and Unloaded by Large British Crane 759
Coast to Coast Trip on Horseback, Boy and Dog Make 280
Coaster Brake, Toy Wagon, Easily Renewed 650
Coconut Oil Butter, How Manufactured, by C. W. Geiger 262
Code, Light, Safety Signal, for Autos 593
Code, New Safety, Pertaining to Grinding Wheels 765
Code, Radiograph, Taught with Phonograph Records 590
Coffee Truck, Fire Department Operates ... 66
Coil, Electrical Resistance, Simple 635
Coils, Care of Pipe, in Hot Air Furnaces 321
Coils, Pipe, Relieve Tension Caused by Expansion 771
Coin Collecting Appliance Shaped like Scoop 900
Coin, Swedish, Ten Inches Square 402
Coins, Gold, Returned to Circulation 112
Coins, Powder Coated, Aid in Trapping Thief 413
Coke, Metallurgical, Produced from Unmixed Coal of Serre Basin 341
Coke, Sulphur Removed from with Hydrogen Gas 583
Cold Chisel, Extension for 791
Cold Chisel Improvised for Cutting Brake Band Rivets 294

Cold Storage Eggs, Preventing Disagreeable Flavor of ... 88
Collars, Stiff, Made into Soft Ones ... 313
College to Give Lectures via Wireless Telephone ... 887
Colleges Advocate Standardization of Athletic Awards ... 816
Colony, Remote Workers', Has Modern Conveniences ... 593
Colophon, Ruins of, Excavations to be Made at ... 934
Color, Amber and Olive-Drab, How to Make 978
Color, New Paint, Said to be Nonpoisonous 905
Color—Red, Fire Engine, Prohibited on Chicago Private Autos ... 238
Color, Venetian Red, Best for Outside Woodwork ... 134
Colors, Harmony of, Revolving Disk Tests .. 900
Colors Now Numbered, Measured, and Matched ... 70
Combination Mail Box Lock ... 600
Combination Tool, Handy ... 783
Comfort Station, Auto Tourists', at Mason City, Ia ... 598
Comment and Review, by H. H. Windsor ... 27, 187, 519, 845
Commerce, Association of, Enterprising Junior, by H. H. Windsor ... 845
Commerce, Department of, New Industrial Machinery Division in ... 815
Commercial Flying Service Starts in California ... 870
Communication with Ship from Telephone Booth ... 742
Community Center at Isolated Power Plant, by Charles W. Geiger ... 888
Commutators, Small, Vse Used for Truing .. 295
Compartment for Tire Chains ... 650
Compass, Beam, Substitute for ... 630
Compass Mounted in Top of Automobile 164
Compound Feeder, Steam Boiler ... 142
Compressed Air Increases Production of Oil 607
Compressed Air Used to Clean Chimneys ... 536
Compression Loss, Engine, Gauge Tests 430
Compressor, Air, and Hoist on One Support 922
Compressor, Overheated Air, Stopped by Fusible Plug ... 868
Compressor, Supercharging, for Airplane Engine ... 386
Compressors, Small Ammonia, Repairing ... 127
Computers, Two Examinations for, by U. S. Civil Service Commission ... 652
Computing Machine, Tax, Has Chart for Any Tax Rate ... 863
Concert, Wireless, Heard by Movie Audience 100
Concerts, Wireless Telephone, Special Phonograph Sends ... 848
Concrete Aggregate, Blower Reduces Cost of 623
Concrete Arch for Bridge Erected in 25 Days 81
Concrete Base for Mail Box ... 647
Concrete Block Aids Pedestrians to Mount Sidewalk ... 435
Concrete Blocks, Imitation, Made of Sandpaper ... 408
Concrete Blocks, Mold for Making ... 123
Concrete Boat Landings and Docks, Making 467
Concrete Building Blocks, Interlocking ... 604
Concrete, Burning Gasoline Removes Asphalt from ... 184
Concrete Canal Lining, Sliding Steel Form for ... 535
Concrete Casings, Porous, as Well Strainers 226
Concrete Chimneys Erected Rapidly ... 37
Concrete Culverts, Collapsible All Steel Form for ... 551
Concrete Dam Made into Foaming Waterfall 393
Concrete Derrick Bases in Texas Oil Field .. 82
Concrete Filling, Historic Elm Saved by 593
Concrete Highway, Amount of, Laid in 1921 354
Concrete Houses, Fireproof, Built Economically ... 676
Concrete Mixtures Automatically Proportioned by Weight ... 387
Concrete Mixtures, Gravel in ... 299
Concrete, Molded, Decorative Effects in ... 722
Concrete Paving, Flexible, Protects Levees, by Ivan E. Houk ... 220
Concrete Piles, Making with Forms ... 286
Concrete Piles, Round, with Great Taper ... 600
Concrete, Removing Stains from ... 125
Concrete Road Built on Sandy Shore Uses Sectional Planking ... 589
Concrete Road Work, Special Trowel for ... 459
Concrete Roads, Float Bridge Aids in Building ... 882
Concrete Ship Buried to Save Expense ... 747
Concrete Ships with Floating Iron Shell being Experimentally Built in Germany 688
Concrete Sidewalk Construction, Faults in .. 778
Concrete Span, Huge, Fire Causes Fall of ... 908
Concrete Standpipe, Unusual Artistic ... 64
Concrete, Tower Tests Waterproofing Material for ... 913
Concrete Trestles to Cross Southern River Swamps ... 98
Concrete Wall Adds to Warmth of House .. 806
Concrete Walls, Preventing Sweating of ... 941
Concrete Wharf Walls Cost Little More Than Timber ... 588
Condenser, Bridging, Adjustable Wireless .. 319
Condenser for Auto Radiators ... 798
Condenser, Ice Machine, Increasing Efficiency of ... 632
Condenser, Novel Marine Engine ... 374
Condenser, Secondary, Improves Auto Ignition ... 748
Conference, Disarmament, at the "U" Table 18
Conference, Second National, in Interest of State Parks ... 979
Conference, The, by H. H. Windsor ... 27
Connecting Rod Wrench ... 785
Conner, Sam E.: Model for Studying Water Power Problems ... 275
Constitution of U. S. Placed in Library of Congress ... 164
Consumer, Locomotive Smoke, of Canadian Design ... 605
Consumers, Smoke, on Locomotives ... 161
Container, Cardboard, for Shipping Eggs ... 862
Container, Food, Water and Air-Tight ... 273
Container, Neat, for Sending Tokens of Friendship ... 868
Container, Safety, for Gauge Glasses ... 449
Container, Soft Soap, Grease Cup as ... 941
Container, Steel Refuse, Made Ornamental .. 760
Container, Tea, Also Measures ... 603
Containers, Soldering Flux ... 800
Contest, Bed Making, for Hotel Chambermaids ... 858
Contest, Employes', to Boost Plant Safety Inspectors ... 274
Contest, Meter Reading, Power Company Holds ... 748
Contest, Music Memory, for Schools ... 816
Contest, Rubber, Gives 10,000 Ideas as to Its Use ... 234
Controller, Automatic, for Gas ... 939
Convention, National Foreign Trade, to Increase American Exports ... 979
Conveyor, Automatic Aerial, for Shingle Bolts ... 860
Conveyor Belts, Speed of ... 138
Conveyor, Long, Serves Two Coal Mines with One Tipple ... 266
Conveyor, Stone, Unloads and Piles for Storage ... 196
Conveyor, Suspended, Carries Traffic Across English River ... 60
Conveyor System, Warehouse, in Minneapolis ... 65
Cooker, Electric, Has Hot Plate and Griddle 767
Cooker, Electric Pressure ... 606
Cookstove, Electric, for Roasting ... 602
Cooling Screen for Cake and Bread ... 766
Coop, Brood, Adjustable Front for ... 472
Coop, Portable, for Little Chicks ... 959
Copeland, Henry C.: 500,000 Shingles Cut by Mill Daily ... 734
Copper and Brass, Galvanizing ... 301
Copper and Lead Alloys, Bureau of Mines to Study Preparation of ... 753
Copper Kettles, Preventing Wear on ... 482
Copper Mining, Traveling Crusher Station and Assay Office for ... 678
Copper, Oxidized, Process for Recovery of .. 902
Copper, Phosphor, Bureau of Mines to Study Preparation of ... 763
Copper Roof 510 Years Old and Still Good .. 53
Copper Salts Added to Casein Glues Increases Resistance to Moisture ... 874
Copper Sheathed Ships Menace Iron Ones ... 917
Copper Shingles, Interlocking, Form Durable Roof ... 528
Copper Sulphate Water Preserves Timber ... 860
Copper, Universal Soldering ... 617
Copy Holding Board, Simple ... 600

Copy, Raised Letter, Machine Makes, for Blind Typists ... 173
Cord Holder, Electric Iron, Clamps to Board 602
Cordwood, Community's, Saw Mounted on Auto Cuts ... 411
Core Box Facing, Hacksaw as ... 942
Cork, Extracting from Bottle ... 797
Cork Extractor Made from Buttonhook ... 474
Cork, Portugal Produces Immense Quantity of ... 328
Corks and Pills, Doctor's Sign Made of ... 122
Corks, Removing Obstinate ... 634
Corn Borer, Insect, Investigate Migration of 908
Corn Harvester, Kafir, Heads Two Rows Simultaneously ... 490
Corn, How to Plant ... 973
Corn, Kafir, Header for ... 781
Corn, Monster Ear of, 30 Feet High ... 223
Corn Planter, Potato Planter Made from ... 956
Corn Shucking Workers, Inner Tubes Aid ... 636
Corn, Sweet, Planting ... 954
Corncribs, Helmets Keep Rats Out of ... 147
Corners, Making Log Cabin ... 447
Corners Painted to Insure Sweeping ... 293
Cornet Player Attachment Eliminates Fingering ... 338
Corrosion, Battery Terminal, Preventing ... 648
Corrosion of Iron Prevented in Manufacturing Sal Ammoniac ... 878
Corrosion, Pipe, Studies Made of ... 46
Cot, Portable, Made from Two Folding Chairs ... 112
Cotter Pin Aids in Deflating Punctured Inner Tubes ... 305
Cotter Pins, Locking ... 617
Cotton, Blue, Now Bleached to Increase Its Value ... 864
Cotton, Imports of Egyptian, Carried on American Ships ... 196
Cotton Made Fireproof by New Process ... 654
Cotton Seed Treated for Elimination of Diseases ... 886
Cotton Warehouses, Fireproof, Models Show 892
Counterbore for Square Bottom Holes ... 138
Countershaft, Small Lathe ... 316
Coupler, Automatic Hose, for Railroad Cars 71
Coupler, Loose Radio, Increasing Efficiency of ... 637
Court-Plaster, Flexible Liquid ... 486
Courthouse, Old Log, in Independence, Mo. Still Used ... 269
Courts, Cement Tennis, Laid with Permanent Lines ... 388
Cover, Cloth Radiator, Keeps Walls Clean ... 932
Cover, Pliant Metal, for Auto Springs ... 933
Covers, Jelly Tumbler, Opened by Pressure in Center ... 439
Covers, Tight Fruit Jar, Removing ... 469
Cowl, Improved Ventilator, Preserves Ships' Cargoes ... 366
Cows, Blooded, Identified by Nose Print ... 915
Cranberry Bogs, Artificial, in the Northwest, by Lawrence W. Pedrose ... 409
Crane Anchored in Wall of Building ... 226
Crane and Trailer Combination Handle Disabled Autos ... 753
Crane Erects Two Section Smokestack ... 182
Crane, Floating, Giant Battleship Converted into ... 666
Crane, Floating, Takes Bridge to Repair Shop ... 15
Crane, Improvised ... 776
Crane, Large British, Weighs and Unloads Coal ... 759
Crane, Lightweight Portable, Has Great Lifting Capacity ... 432
Crane, Magnet, Mounted on Electric Locomotive ... 175
Crane, Radial Shop ... 131
Cranes, Electric, Handle Lumber in Large Yard ... 228
Cranes, Three, Carry Huge Casting ... 247
Crank, Lumber Truck Ratchet, Facilitates Unloading ... 758
Crankcase Bolt Holder, Auto ... 138
Crankcase Oil Meter Shows Viscosity of Oil 380
Crankpin Tool, Adjustable, Easily Operated by Hand ... 771
Crankshaft and Piston Jig, Universal Alinement ... 77
Crankshaft as a Riveting Anvil ... 141
Crankshaft Turning Tool ... 451
Crate, Battleship, President's Turkey Shipped in ... 414
Crate on Auto Running Board for Hunting Dogs ... 171
Crates, Fence for Baby Made of ... 811
Crates, Maximum Strength, Making ... 125
Crawfish Extermination Stops Canal Bank Leakage ... 253
Crawford, R. P.: Ruins, Ancient, Excavations of ... 537
Cream, Cleansing, Prizes Offered for Best Household Uses for ... 980
Creeper, Adjustable, for Repairing Under Autos ... 520
Creosoted Wood Silos ... 784
Creosoting Tube, Immense, Makes Freak Shipment ... 674
Crib, Baby, Also Contains Wardrobe ... 438
Cribbage Board Carved from Walrus Ivory 761
Crime Detection, Radiophones to Aid ... 489
Crime Mysteries Solved by Structure of Hair, by John Anson Ford ... 571
Criminals, Shackle Boot Prevents Escape of 525
Cripple, Blind and Deaf, Operates Typewriter ... 673
Cripples, Industrial Rehabilitation of, by Wm. A. McGarry ... 33
Crocodile Flesh, Borneo Inhabitants Eat ... 752
Crossing Markers, Street, White Cement Blocks for ... 885
Crossing Signal, Railroad, New Type ... 389
Crossing, Triple Risk ... 433
Crossman, Capt. Edward C.: Pistol, 20 Gauge Shot ... 405
Crown Prince, Return of Japanese, Celebrated by Fireworks Display ... 374
Crusher, Chemical, Made from Spoon ... 470
Cruiser, French, Converted into Fish Drying Factory ... 260
Crusher, Soil, Made from Mower Wheels ... 486
Crusher Station, Traveling, and Assay Office for Copper Mining ... 678
Crystal Palace Tower Tanks, Preserving from Rust ... 904
Cuff Holder Enables Sleeve to be Pulled Up 930
Cuff Links, Flexible, Allowes Cuff to be Pulled Up ... 273
Cultivator, Ladder Cart, and Truck, Wheelbarrow Convertible into ... 525
Cultivator, Motor Vineyard, Operated by One Man ... 724
Culverts, All Size Concrete, Collapsible All Steel Form for ... 551
Cup, Caster, for Leveling Short Legged Furniture ... 768
Cup, Electric, for Heating Liquid Contained Glasses ... 115
Cupboard, Shallow, Enlarging ... 332
Curb, Concrete Block Aids Pedestrains to Mount ... 435
Curb, House Number on, to Guide Motorists ... 906
Currants, Planting Lettuce Near ... 645
Curtain and Drapery Support for Hanging Separately ... 767
Curtain, Roller, on Bootblack Stand ... 724
Curtains, Device Aids in Hanging ... 642
Cutter, Metal, Has Horizontal Band Saw ... 31
Cutter, Pipe, Improving the ... 783
Cutter, Small Bolt, How to Make ... 787
Cutting Machine, Foundry Sand, Hand Propelled ... 534
Cutting Machine, Mortar, for Brickwork Joints ... 196
Cutting Machine, Sod, Preserves Lawn ... 446
Cutting Tool, Asphalt Pavement, on Work-Car ... 96
Cutting Torch Produces Ornamental Ironwork ... 787
Cyclecar, Propeller Driven, Built like Airplane ... 759
Cylinder Base Nuts, Wrench for ... 297
Cylinder Gauge, Accurate, with Registering Dial ... 764
Cylinder Head Bolts, Wrench for ... 448
Cylinder Head Gaskets, Locating ... 942
Cylinder Heads, Clothespins Aid in Replacing ... 292
Cylinder Reaming Machines, Homemade ... 620
Cylinders, Gauge for Measuring Oversize in 750

Dacy, G. H.:
Dishes Standardized to Prevent Breakage 755
Telephones that Tell No Tales ... 524
Dam, Concrete, Made into Foaming Waterfall ... 393

Dam Construction for Water Power Development in Southwestern States..... 370
Dam Construction, Tieton, Mining Methods Applied to, by S. R. Winters..... 358
Dam, Elevator Lifts Fish Over..... 277
Dam for Water Power Development in Arkansas, by Tom Shiras..... 574
Dam, Great Californian, Proves Success, by Frank B. Howe..... 368
"Dam is Breaking" Heard Four Miles, by H. A. Lane..... 9
Dam, New Irrigation, of Multiple Arch Type 102
Dam, Waterworks, Absolute Control of River with..... 701
Dampness, Device Prevents Damage from.. 429
Dams, Canadian River, Fish Ladders on.... 355
Danger Sign Simulates Rear Auto..... 746
Danger Signal, Street, Protects Autos Day or Night..... 584
Darning Machine, Hand..... 403
Dashboard Instrument, Auto, Gives Warnings to Driver..... 198
Dashes, Long, Used in Drafting..... 288
Date Harvesting Requires Skill and Agility 924
Davenport Convertible into Bed..... 114
Daylight, Artificial, Tinted Glass for Producing 674
Days of '76 and Now, by H.H. Windsor.... 846
Deaf and Blind, Conversation Understood between 364
Deaf and Blind Converse by Different Methods 773
Deaf and Blind Girl Develops Wonderful Sense of Touch and Smell, by Fred L. Holmes 13
Deaf, Partially, Vacuum Tube Amplifier Aids 704
Debt, Our War, by H. H. Windsor..... 27
Declaration of Independence Placed in Library of Congress..... 164
Decorating Appliances:
Stencils, Roller for..... 286
Wallpaper, Electric Steam Machine for Removing 903
Wallpaper Machine Holds Paste and Paper 680
Deer—Reindeer Raising Attempted in Michigan 742
Dehorner Removes Both Horns at Once.... 938
Dehydrator, Food, for the Home..... 504
Dehydrators Investigated for Fruit Drying 492
Delivery Truck, Motorcycle Improvised as.. 957
Delivery Truck, Three Wheeled Auto..... 496
Dental Appliance, New, X-Ray Photos Magnified with..... 38
Dental Clinics in Schools Increasing..... 105
Dental Offices, Special Light for..... 112
Deodorizer for Purifying Stagnant Rooms.. 603
Department of Commerce, New Industrial Machinery Division in..... 815
Department Store, Self-Government Practiced by..... 933
Depth Gauge, Scale Used as..... 949
Derby, Dog Team, Great American..... 751
Derrick Bases, Concrete, in Texas Oil Field 82
Derrick, Huge Floating, for Logging Operations 725
Desert Roadway Fenced to Guide Motorists 666
Desk, Collapsible, Fits in Safe..... 101
Desk—Express Office, Portable (see Office).. 75
Desk Tray, Adjustable..... 42
Desk Tray, New, Is Windproof and Convenient 242
Destroyers, Thirty-Six, Moored at One Pier 25
Detection and Identification Means, Improvements in..... 72
Developing Holder for Cut Films..... 468
Developing Tray, Improvised..... 977
Dial, Watch, Standard and Summer Time Shown on..... 798
Diamonds Quickly Transported from Mines by Airplane..... 407
Diamonds, Wheel Truing, Care of..... 776
Diaphragm, Lead, Used with X-Ray Apparatus 166
Diatomite Mine, Valuable, Operated in Oregon 408
Dickie, Francis:
City, Walled Chinese, Modernizing a..... 509
Radium Bearing Minerals Found on British Columbia Islands..... 335
Totem Poles, Indian "Copyright Law" Concerning 898
Dictaphone, One, Ten Pupils Take Dictation from 506
Dictaphone Reproducer, Loud-Speaking, for Records 871
Die and Punch, Easily Made..... 952
Die, Simple Grommet..... 638
Die Stock Takes Round Dies of Different Diameters 106
Digging Machine, Huge Ditch, for Reclaiming Swamp Lands..... 344
Digging Machine, Shaft, and Caisson Sinker 98
Digging Machine, Tunnel, Also Lines Walls 4
Digging Tool, Pneumatic Clay..... 257
Dike, Long, Protects Channel from Drifting Sand 558
Dimmer, Auto Glare, Protects Driver..... 41
Diner, English Railroad, Electrically Equipped 856
Dioxide, Carbon, Measured by Electrical Indicator 76
Dirigible Airships, Great Britain Abandons 694
Dirigible, Helium Inflated, First Flight of... 230
Dirigible "Roma" Meets with Disaster..... 518
Dirigibles a Complete Failure, by H. H. Windsor 519
Disarmament Conference at the "U" Table.. 18
Discoloration of Prints, Preventing..... 796
Discoverer—Amundsen to Attempt North Pole Flight, by Lawrence W. Pedrose.... 875
Discoverer—Robert E. Peary, Monument to 824
Dish Drainer for Kitchen Sink..... 930
Dish, Food, Water and Air Tight..... 273
Dish, Fruit, Made from Trench Helmet..... 147
Dish Scraper, Easily Made..... 313
Dish Scraper, Rubber Blade..... 930
Dish, Soap, as Auto Fitting..... 155
Dish Washer, Sanitary..... 931
Dishcloth Holder for Washing in Hot Water 602
Dishes Standardized to Prevent Breakage, by G. H. Dacy..... 755
Dishwashing, Faucet Guard for..... 972
Dishwashing Machine, Portable..... 94
Disinfecting Chambers for Freight Trains, by S. R. Winters..... 595
Disk, Revolving, Tests Harmony of Colors.. 900
Disk Wheels, Spare, Lock for..... 74
Dispensing Machine, Peanut Butter, Also Mixes 442
Distributing Machine Places Fruit in Several Compartments 446
Distributor, Sweeping Compound..... 650
Ditch Digging Machine, Huge, for Reclaiming Swamp Lands..... 344
Ditch Screen, Irrigation, Keeps Fish Out... 117
Ditcher, Tile, Horse Drawn..... 913
Ditching Machine, Railroad, Displaces Many Men 873
Dividers, Self-Centering..... 126
Diving Helmet, Shallow Water..... 222
Diving Stunt, Spectacular, Ends in Death... 904
Divorce Ring for Grass Widows..... 607
Dock, New Type, for Loading Barges..... 232
Dock Walls, Concrete, Cost Little More Than Timber 588
Docks and Boat Landings, Making Concrete 467
Doctor's Sign Made of Corks and Pills..... 122
Document—Peace Plan, Japanese Women's, 300 Feet Long..... 2
Document—Treaty, Four Power, 19 Signatures to..... 189
Documents, Historic, Placed in Library of Congress 164
Dog, Adjustable Lathe..... 299
Dog Propels Automobile for Movie Actor... 609
Dog Team Carries Mail in Southern California 721
Dog Team Derby, Great American..... 751
Dog, Toy, that Barks like Real..... 121
Dogs Aid in Sawing Wood..... 297
Dogs—Fox Hounds, Specially Designed Auto to Carry..... 887
Dogs, French Army, Parisians Contemplate Memorial in Honor of..... 736
Dogs, Hunting, Cage on Auto Running Board for..... 171
Dogs, Pinch, Belt Fasteners as..... 293
Dogs Used for Winter Travel in Northern Quebec 59
Doll House Furniture, Making Lead..... 809
Doll that Cries Audibly and Sheds Real Tears 546
Doll that Kicks Its Feet and Waves Its Hand When Buggy Moves..... 608
Dollar Enclosed in Case Teaches Simple Object Lesson..... 546

Dolls and Animal Toys Made of Inner Tubes 164
Dome, Large, Clever Scaffolding for Painting Interior of 869
Door, Automatic Fire, for Locomotives 193
Door Catch, Screen, Can be Securely Locked 569
Door, Garage, Automatically Opens by Weight of Car 364
Door Hinge Protects Fingers from Being Mashed 768
Door Hinge, Screen, Permanent Fastenings for 972
Door Lock Cylinders Easy to Install 90
Door Lock, Handy Portable 635
Door Lock, Key Guide for 973
Door Lock, Sturdy Burglar Proof 606
Door, Padlocked, Opened from Either Side 959
Door Planing, Improvised Wedge for 292
Door, Revolving Safety, Foils Bandits 221
Door Signal Warns Trucks Loaded too High 270
Doors, Garage, Locked Any Position by Toggle 278
Dough Mixer, Electric, Grinds Coffee, Chops Ice, Beats Eggs, and Freezes Cream 603
Down Spout, Auto Exhaust Cleans 145
Draft Evaders, Few Real "Slackers" in List of 85
Draft Fan, Induced, Aids Eliminating Cinders 591
Draft Necessary for Farm Implements 643
Drafting Beam Compass, Substitute for 630
Drafting Instrument for Drawing Ellipses or Ovals 113
Drafting, Light Reflector for 301
Drafting, Long Dashes Used in 288
Drafting Problems, Bridge Models Show 293
Drafting—Tapered Work, Laying Out 794
Drafting—Tracing, Inking in Temporary Details on 302
Drafting Tracings, Keeping Trace of 302
Drafting Triangle, Eyelets for 142
Drain Pipes, Forcing Obstructions from 471
Drain Pit, Filling Station 302
Drain, Street, and Manhole in Combination Inlet 859
Drain Tile, Broken, as Outdoor Stove 145
Drain Tile, Vases and Artistic Lamps Made from 486
Drainer, Dish, for Kitchen Sink 930
Drapery and Curtain Support for Hanging Separately 767
Drawer, Drawing Board, Keeping in Place 955
Drawers, "Built In," Saves Room Space 960
Drawers, Easily Made 631
Drawers, Stock, Safeguarding Price Marks on 614
Drawing Board Clamp 295
Drawing Board, Countersunk Thumbtacks for 629
Drawing Board Drawer Kept in Place 955
Drawing Board, Large Cheap 466
Drawing Paper, Reel for 125
Drawing Pencils, Sharpening 458
Drawing Table Drawer, Novel Arrangement for 134
Drawings, Trimming with Knife 953
Dredging Oysters on the Ice, by Lindsay C. Marshall 55
Drier, Electric Hair, How to Make 143
Drier, Electric Hand, Built in Wall 442
Drift, Drill Press, Handy 288
Dirigible "Roma" Victims, Last Rites for 754
Drill and Tap Chuck, Safety, Protects Tools 748
Drill, Breast, Aided with Tap Wrench 132
Drill Chuck, Ball Grip 618
Drill Chuck, Quick Change, Soft Shearing Pin for 274
Drill, Diamond Core, for Drilling Oil Wells 521
Drills for Slate or Marble 793
Drill, Hand, Valve Grinder Made from 140
Drill Holes, Test, Interesting Process of Surveying 912
Drill Outfit, Portable Electric, Tree Surgery with 419
Drill Press Drift, Handy 288
Drill Press Salesman Mounts Drill on Auto 246
Drilling and Stud Setting Machines for Propellers 234
Drilling, Clamping Work for 781
Drilling Device, Motor Driven, Also Grinds and Buffs 568
Drilling Horizontal Holes Accurately 790
Drilling Machine, Gantry, for Drilling Plates 97
Drilling Machine, Novel Tap Holder for 955
Drilling, Soap as Lubricant for 618
Drilling Tempered Springs 459
Drilling, Tile 139
Drills, Wet, Reduce Dustiness of Mines 826
Drinking Cup, Lens Hood Made from 960
Drinking Fountain Attached to Fire Hydrant 632
Drinking Fountain, Sanitary, Filter, and Bottle Washer Contained in Faucet Attachment 115
Drinking Fountain, Trench Helmet 148
Drinks, Self Mixed, Automatic Fountain Serves 743
Drive, Overhead, for Lathe Attachments 628
Driver, Tiny Pile, Drives Pipes at Pole Base 902
Driveway, Vehicle Gate for 810
Driving, Auto, through Snow 133
Driving Pipe Underground 788
Driving Tool for Long Slender Pins 448
Driving Unit for Banding Motor Generators 455
Dropper, Medicine, Kept Handy on Bottle 960
Drug Trade, American, Booming in Bombay 340
Drydock, Natural, Rise and Fall of Tide Permits 529
Drydock, Smallest Floating Steel, Launched 223
Drydock, Work on Canadian, Ordered Abandoned 872
Drying, Fruit, Dehydrators Investigated for 492
Drying Stretcher for Prints 145
Ducks—Geese Killed in Electric Storm (see Geese).
Ducks, Little, Hen Mothers 937
Dump, Automatic Car, Newly Designed 917
Dumping Car, Monorail, for Use on Farms 910
Dumping Device, Clever, on Smugglers' Boat, by Lawrence Wm. Pedrose 391
Dumping Truck, Automobile 261
Dunn, H. H.: Earthquakes, Accurate Forecasting of, Now a Scientific Possibility 501
Dust Cap, Threadless, for Auto Tires 768
Dust Guards on Eccentric Straps 615
Dust, Preventing While Auto Painting 314
Dust Shield for Plow Wheels 638
Dustpan Which is Held in Position with Foot 438
Dyes, Germ Killing, Experiments in Production of 834
Dyes, Two New, Discovered in Coal-Tar Products 770
Dynamite, Ingenious Uses for 954

Earache Pad, Electrically Heated 272
Earthquake, Violent, Under Pacific Ocean Recorded 752
Earthquakes, Accurate Forecasting of, Now Scientific Possibility, by H. H. Dunn 501
Earthquakes from Deep Regions of the Earth 40
Eave Trough Down Spout, Auto Exhaust Cleans 145
Eave Troughs, Repairing with Cement 976
Ebonite, Machining and Finishing 138
Eccentric Spool, Toy 308
Eccentric Straps, Dust Guards on 615
Eccentrics, Repairing Worn 630
Echo Employed on Ships for Measuring Ocean Depth 689
Editorials, Cultural Education, Prizes for 323
Egg Beater, Water Power, Fits Any Faucet 766
Egg Carrier, Cardboard, for Shipping 862
Egg Opener, New Sanitary 266
Egg Sex Detector Lacks Merit, Government Tests Show 554
Egg Tray, Incubator, Turns All Eggs at Once 714
Eggs, Cold Storage, Preventing Disagreeable Flavor of 88
Einstein Theory, Motion Pictures to Illustrate 892
Ejector, Combined Suction, for Pumping Out Cellars 521
Electric Arc Welding Outfit with Current Control 74
Electric Auctioneering Machine 224
Electric Bath Cabinet, Folding 233
Electric Bottle and Glass Washer 36
Electric Brass Furnace, Revolving Mold Table on 386
Electric Buzzer, Sewing Machine Prospects Heralded by 550
Electric Camera, Huge, for Making Maps 343
Electric Candle and Wreath Minimize Fire Risk 218

Electric Clothes Wringer with Soft Rubber Rollers 438
Electric Control for Gas Water Tank Heater 381
Electric Cooker Has Hot Plate and Griddle 767
Electric Cookstove for Roasting..... 602
Electric Cranes in Large Lumber Yard Saves Time and Labor..... 228
Electric Cup for Heating Liquid Contained Glasses 115
Electric Currents, Feeble, Sounds Measure, by C. A. Briggs..... 488
Electric Drill Outfit, Portable, Tree Surgery with 419
Electric Equipment on English Railroad Diner 856
Electric Fan as Window Display..... 808
Electric Fan, Spherical, Throws Air Radially 918
Electric Fans, Air Purifier and Deodorizer Attachment for 930
Electric Food Mixer for Medium Sized Kitchens 436
Electric Furnace, Automatic, for Treating Steel Parts 694
Electric Furnace Has Self-Adjusting Electrodes 897
Electric Hair Clipper Has Motor Installed in Handle 394
Electric Hair Drier, How to Make..... 143
Electric Hair Marcelling Iron..... 273
Electric Hand Drier Built in Wall..... 442
Electric Heat Treatments, Apparatus for Giving 520
Electric Heater for the Sick Room..... 766
Electric Heater Made from Auto Headlamp 471
Electric Heater, Small, Possesses Many Merits 701
Electric Hot Plate for Toasting and Heating 272
Electric Incubator Regulated by Thermostat 578
Electric Indicator, Carbon Dioxide Measured by 76
Electric Iron as Vulcanizer..... 306
Electric Iron Cord Holder Clamps to Board 602
Electric Iron for Hats..... 602
Electric Iron Indicating Switch..... 305
Electric Lamp, Counterbalanced, for Hanging Over Chair or Bed..... 438
Electric Lamps Made from Vases and Drain Tile 486
Electric Lamps Used for Heating, Safety in 474
Electric Light Pull Chain, Extension for.. 318
Electric Light, Special, for Dental and Operating Rooms 112
Electric Lighting Project for French Villages 844
Electric Lights on Piano Show Tonal Production 500
Electric Lights Turned on by Alarm Clock. 312
Electric Lights Used for Heating Purposes 610
Electric Locomotive, Magnet Crane Mounted on 175
Electric Manifold Heater for Cold Engines. 266
Electric Milking Machine Extensively Used in New Zealand 830
Electric Mixer Chops Ice, Grinds Coffee, Beats Eggs, and Freezes Cream..... 603
Electric Motor, Small, Fits Any Phonograph 765
Electric Nightcaps for Warming Cold Heads 41
Electric Pad for Earache..... 272
Electric Phonograph Motor, Simple..... 40
Electric Power, Low Grade Coal to Produce 830
Electric Power Plant on Skagit River Projected 342
Electric Power Resources, Records of, Kept by War Department..... 198
Electric Power Stations, Chicago, Enormous Capacity of..... 394
Electric Pressure Cooker..... 606
Electric Radiator Warmer for Auto Prevents Freezing 578
Electric Range Has Switch with Two Pilot Lamps 45
Electric Sealing Machine..... 418
Electric Sealing Wax Applier..... 100
Electric Signal for Freight or Passenger Trains 36
Electric Steam Boiler Economically Operated 594
Electric Steam Machine for Removing Wallpaper 903
Electric Sterilizer for Razors..... 564
Electric Storm Kills Wild Geese..... 75
Electric Table Lamp, Japanese..... 144
Electric Teakettle Has Two Compartments. 746
Electric Testing Unit, Portable..... 781
Electric Toaster and Heater Combined.... 439
Electric Torch Successful in Underwater Cutting 745
Electric Train, Russian, High Powered.... 675
Electric Train, Wireless Installed on..... 352
Electric Truing Device for Lathe Work.... 224
Electric Vacuum Brush for Dusting..... 115
Electric Valve Tube Made with Reversible Feature 47
Electric Vulcanizer 400
Electric Waffle Baker Easy to Clean..... 602
Electric Washer Pump for Emptying Water 931
Electric Washing Machine Has Electric Light 930
Electric Water Heater..... 356
Electric Waves Guide Airplanes through Night and Fog, by H. A. Lane..... 329
Electric Welder Uses Alternating Current. 679
Electric Window Radiator Prevents Frost. 725
Electrical Achievements Signalize Unknown Hero Honors, by John W. Kean..... 19
Electrical Arc Welding Machine Uses Alternating Current 848
Electrical Equipment, Exported, Amount of 375
Electrical Faults in Autos, Wrist Meter for Locating 328
Electrical Gas Controller, Automatic..... 939
Electrical Heating, Odd Departure in, Used in Switzerland 847
Electrical Machinery, Ventilation for, Increases Efficiency 868
Electrical Resistance Coil, Simple..... 635
Electrical Wire Measurements, Terms Used in 777
Electrical Workers, Shoenails Peril..... 632
Electrically Heated Knife Aids Battery Men 826
Electrically Heated Steam Boiler..... 975
Electrically Heated Type Engraves Fountain Pens 506
Electricity—Alarm Circuit for Open Fuses 794
Electricity—Battery Voltage Reverses at Low Temperatures 242
Electricity—Fuses, How to Bridge..... 807
Electricity—Lightning Bolt, Artificial, Realistically Produced 681
Electricity—Machine, New, Changes Low-Voltage Alternating Current to High-Voltage Direct Current, by H. A. Lane... 821
Electricity, Newly Mown Hay Dried by.... 594
Electricity, Prize Offered for Best Work on. 980
Electricity—Transformer, Million Volt, for Laboratory 497
Electricity—Transformer, Semaphore on, Signals Overload 508
Electricity—Transmission Line, Long, on Pacific Coast Nearing Completion..... 567
Electricity—Transmission Line to Span Straits of Messina 728
Electricity—100,000 Volts Carried over Berlin Streets 98
Electrochemical Process for Manufacture of Metallic Calcium 900
Electrodes, Self-Adjusting, in Electric Furnace 897
Electrolyte in Storage Batteries, Testing Height of 321
Electrolytic Reflector Plates, "Forming"... 646
Elephant, Wooden Leg for, as Added Attraction 868
Elephants Board Train at Passenger Station 38
Elephants Destroy Oil Pipe Lines in Island of Sumatra 567
Elephants Used to Test Flooring..... 718
Elevated Roads, Automatic Bumper Prevents Collisions on..... 522
Elevating Platform Truck Has Gasoline Motor 882
Elevating Platform Truck Has 4 Lifting Legs 929
Elevator Gates, Sidewalk, Prevent Accidents 8
Elevator, Huge Grain, to be Constructed at Montreal, Canada 589
Elevator, Novel, Lifts Fish Over Dam..... 277
Eliminators, Demountable Air Moisture.... 929
Ellipsograph Also Draws Ovals..... 113
Elm, Historic, Saved by Concrete Filling... 593
Emblems, Ingenious, at Football Game.... 206

Emery Belts, Prolonging Life of..... 946
End Gate, Elevating, Attached to Motor Truck 877
Endurance Flight, America Sets World Record for 380
Energy, Sewing, Required by Hand and with Machines 87
Engine, Air Cooled Auto, Has Novel Features 559
Engine, Airplane, Light High Power, of British Design 541
Engine, Auxiliary Starting, for Airplanes.. 364
Engine, Best Airplane, Prize Offered for.... 159
Engine Building, Model Gas, Hints on..... 812
Engine Condenser, Novel Marine..... 374
Engine Crankshaft Turning Tool..... 451
Engine Crankshafts and Pistons, Universal Alinement Jig for..... 77
Engine Cylinder Compression Loss, Gauge Tests 430
Engine Cylinder Head Gaskets, Locating... 942
Engine Cylinder Reaming Machines, Homemade 620
Engine Cylinders, Gauge for Measuring Oversize in 750
Engine Direction Shown by Automatic Telltale 282
Engine, Forest Rangers' Fire, Can be Carried on the Back..... 170
Engine, French, Three Carburetors on..... 5
Engine Fuel Measuring Tank Aids Oil Consumption Tests 270
Engine, Gasoline, Drives Novel Power Shovel 832
Engine Grates Made from Old Tires..... 124
Engine Hoppers, Gas, Float Valve for..... 638
Engine Hoppers, Gas, Preventing Water Slopping in 631
Engine, Italian Airplane, of Diesel Type.... 344
Engine Lathe, Automatic, for Quantity Production 699
Engine, Miniature Traction, Carries Large Load 772
Engine Muffler for Home Lighting Plants.. 158
Engine Piston, Improved Design, Saves Oil and Gas 770
Engine Pistons, Iron, Made Light by Skillful Design 680
Engine Silencer, Air Craft, of Swiss Design 490
Engine Starting Made Easy with Carburetor Heating Device 534
Engine, Straight Eight, English Auto Has.. 56
Engine, Sunken Donkey, Stump Puller Raises 239
Engine Testing at the Muffler..... 949
Engine to Operate Combined Harvester Thresher 774
Engine, Truck, Dismantled in Record Time 925
Engine, Twin Cylinder Oscillating, How to Make 639
Engine Valves, Overhead, Rocker Lever for 158
Engine Valves, Overhead, Rocker Lever for Patented 781
Engine Valves, Slapping, Curing..... 460
Engine Valves, Using Old..... 150
Engine Water Jacket, Cracked, Repairing. 624
Engines, Airplane, Supercharging Compressor for 386
Engines, Auto, Kerosene Mixing Chamber for 607
Engines, Cold, Acetylene as Primer for..... 950
Engines, Fluctuating Load, Should Have Speed Limiting Device..... 793
Engines, Gasoline, Device Atomizes Fuel in 436
Engines, Oil and Air Cooled, Developed in England 925
English Possessions, Linking by Wireless.. 522
Entrance, Cave, Mentioned in "Last of the Mohicans" 772
Envelope Moistener Has Tray for Accessories 765
Envelope Sealing Wax Applier, Electric... 100
Envelopes, Hang Up Filing, for Phonograph Records 768
Eraser as Rubber Stamp for Floor Layouts 777
Eskimos' Whaling Boats are American Built 721
Essay Contest, Prize, to Encourage Temperance Study in Schools..... 980
Essays, American History, Prizes Offered for 487
Essays, George Washington, Prizes Offered for 159
Essays, Good Roads, University Scholarship Offered for 815
Essays, Kindness to Animals, Prizes for.... 815
Etching, Improved Resist for..... 632
Ethiopian Records, Boston-Harvard Expedition Finds 172
Evaporator Tubes Arranged in Diagonal Lines 886
Examinations, Air Service, to Appoint Flying Cadets 979
Examinations, Civil Service, for Computers 652
Examinations, Civil Service, for Instrument Makers 487
Excavations Will be Made at Ruins of Colophon 934
Exercising Machine Made from Old Inner Tubes 306
Exhaust, Auto, Cleans Down Spout..... 145
Exhibition, Auto, in China Housed in Bamboo Shed 738
Exhibition Building, Huge, Used for Cattle Barn 579
Exhibits of Junior Association of Commerce by H. H. Windsor..... 845
Exhibits, Portable Express Office for..... 75
Exhibits, U. S. Mining, at Brazilian Centennial Exposition 508
Expedition, Boston-Harvard, Finds Ethiopian Records 172
Expedition Expects to Scale Mount Everest 30
Expedition, North Pole, Amundsen to Attempt, by Lawrence W. Pedrose..... 875
Expedition to Investigate Mountains of Burma 827
Expeditions, Field Museum, of Scientific Research 596
Expense and Mileage Recorder for Motorists 260
Experiment Station, Forest, Established in South 32
Explorer—Amundsen to Attempt North Pole Flight, by Lawrence W. Pedrose..... 875
Explorer, Arctic, Monument in Honor of.... 824
Explorer on Ship "Quest" Terminates Twenty Years of Adventure..... 507
Explosion, Automobile Striking Gas Causes 505
Explosion, Ferryboat Boiler..... 865
Explosion—Locomotive Explodes with Unusual Violence..... 907
Explosion, Oil Refinery Still..... 252
Explosions, Mine, Automatic Gas Sampler for 530
Explosions, Mine, Caused by Telephone..... 570
Export Trade, Plan to Aid, Abandoned by Sponsors 573
Exports, American, National Foreign-Trade Convention to Increase..... 979
Exposition, Brazilian Centennial, U. S. Mining Exhibits at..... 508
Exposition, Live Stock, Prizes Offered in.... 815
Exposition, Permanent, for Candy Industry 78
Exposure Parks for Testing Roofing Materials 923
Express Office, Portable, for Fairs and Exhibits 75
Extension Attachment for Carpenters' Planes 561
Exterminating Machine, Weed and Insect... 423
Eye Splice, Superior Rope..... 288
Eyelets for Draftsman's Triangle..... 142
Eyelets, Wire Terminals Made from..... 805

Face Milling with Side Mills..... 451
Facing, Core Box, Hacksaw as..... 942
Factory, Broom, Blind Union Men Run..... 104
Factory Safety Inspectors, Employes Contest to Boost..... 274
Factory Truck, Two-Purpose, Has 4 Lifting Legs 929
Fair Leader, Simple, for Guiding Cables.... 383
Fair, Sixth Swiss Sample, to be Held at Basle 652
Fairs, Portable Express Office for..... 75
Falls, Minnehaha, Beauty to be Restored to 282
Fan Belt, Emergency..... 286
Fan Belts, Slipping, Adhesive Tape Cures... 481
Fan, Electric, as Window Display..... 808
Fan, Induced Draft, Aids Eliminating Cinders 591
Fan, Spherical Electric, Throws Air Radially 918
Fans, Electric, Air Purifier and Deodorizer Attachment for..... 930
Farm Hoist, Simple..... 312

Farm Implements, Draft Necessary for..... 643
Farm, Missouri, Has Horseshoe Shaped Barn 104
Farm Tractor Has Three Wheel Drive..... 76
Farming, Fish, of South Sea Islanders..... 278
Fasteners, Snap, Easily Attached..... 272
Faucet Attachment for Holding Kettle..... 114
Faucet Attachment Is Drinking Fountain, Bottle Washer, and Filter Combined..... 115
Faucet Guard for Dishwashing..... 972
Faucet, Pipe Freezing to Remove..... 636
Faucets, Hose, Preventing Use of..... 971
Faucett, T. Benjamin: Vaults, Safety Deposit, Building..... 376
Feathers, Six Carloads of, Weigh 500,000 Pounds 568
Federal Aid, Stop, by H. H. Windsor..... 28
Feed Pawl, Shaper, Arrow Cut on, Saves Time 792
Feeder, Steam Boiler Compound..... 142
Feeding Tray for Birds..... 811
Felt Tires for Rocking Chair..... 642
Felt Weaving Loom is Largest Ever Constructed 728
Fence, Desert Roadway, to Guide Motorists 666
Fence for Baby Made of Crates..... 811
Fence Made of Worn Out Auto Tires..... 901
Fencepost, Facilitating Removal of..... 799
Fencepost Preserved by Trench Helmets..... 147
Fenders, Bent Auto, Press for Straightening 461
Fern Trellis, Indoor, Made of Chain..... 978
Ferns Grown in Florida for Northern Markets 186
Ferry, Auto, Floored Scow Does Duty as..... 84
Ferry, Suspended, Carries Traffic across English River 60
Ferry System, Cable, Floats Ice across River 192
Ferryboat, Large, Terrific Boiler Explosion on 865
Fertilizer or Flivvers, by H. H. Windsor..... 519
Field Museum Expedition of Scientific Research 596
Fig Tree, Tropical, Bears Fruit in Northern Back Yard..... 54
Figs, Three Wheeled Platform for Gathering 38
Figures, Wood, Attract Attention to Windows 10
File Attachment, Flat..... 12
File, Mill, Sharpening Tools with..... 295
Filing Envelopes, Hang Up, for Phonograph Records 768
Filing Guard, Safety Razor Blades as..... 449
Filing Kink for Filing Papers in Binders... 978
Filing Kink for Saws..... 941
Fillets, Leather, Made for Wood Patterns... 132
Filling Cap, Self Acting, for Auto Gas Tanks 600
Filling Station, Drain Pit for..... 302
Filling Station Gasoline Calculator, Price and Quantity..... 138
Film, Cut, Developing Holder for..... 468
Film, Motion Picture, Prepared on Fast Moving Train, by Jack A. Bristol..... 420
Film, Paper Backed, Photographic, Introduced in Germany..... 193
Film Printer, Movie, Light Density Control for 360
Film Stripping from Old Negatives..... 786
Films, Motion Picture, to Teach History in Schools 882
Films, Old, Stencils Made from..... 450
Filter, Bottle Washer, and Drinking Fountain Contained in Faucet Attachment.... 115
Filter, Feed Water, How to Make..... 785
Filters, Ordinary Cistern, Do not Purify Water 38
Finger Clips for Oilcans..... 157
Finger Prints, Improvement in Identification of..... 72
Fingerprints of House Fly..... 253
Fire Call Adopted by Canadian Communities 391
Fire Causes Fall of Huge Concrete Span.... 908
Fire, Chicago, Most Menacing Since Great Fire 685
Fire Department Operates Coffee Truck.... 66
Fire Door, Automatic, for Locomotives..... 193
Fire Engine, Effective, High Speed Turbine Pumps on Auto Makes..... 677
Fire Engine, Forest Rangers', Can be Carried on the Back..... 170
Fire Engine, Japanese, Has Narrow Escape 371
Fire Engine Suction Ejector for Pumping Out Cellars..... 521
Fire Extinguishing Pistol Also Repels Burglars 237
Fire Fighting, Wheat Field, in Eastern Washington 658
Fire Hydrant, Drinking Fountain Attached to 632
Fire Hydrants, Protecting from Snow..... 158
Fire Ladder for Fighting Roof and Chimney Fires..... 274
Fire Menace, Gas Filled Toy Balloons Declared 683
Fire Regulations Safeguarding Ships..... 118
Fire Reservoir Cover, Roller and Ice Skating on..... 412
Fire Sign, Street, Compares Number of Fires with Previous Year..... 435
Fire Throwing Machine for Melting Snow.. 325
Firemen Donate Artificial Leg to Injured Boy 608
Firemen's Pushball Game Affords Novel Entertainment 62
Fireplace, Boy Scout, for Study of Geology.. 94
Fireplace, Furnace Cement Repairs..... 645
Fires, Forest, Gasoline Speeder for Combating 566
Firework Celebration for Return of Japanese Crown Prince..... 374
First Aid Box, Accident, Installed on Busy Berlin Street..... 354
First Aid Packets Carried Visibly on Pullman Cars..... 506
First Aid Treatment for Carbon Monoxide Poisoning 552
Fish Aided Over Dam by Novel Elevator... 277
Fish and Snake Skins Used as Shoe Leather 567
Fish Bait Made from Minnow Contained Bottle 970
Fish Drying Factory, French Cruiser Converted into..... 260
Fish Farming Occupation of South Sea Islanders 278
Fish Kept Out of Irrigation Ditches by Screen 117
Fish Ladders on River Dams in Canada..... 355
Fish Landing Net, Pocket..... 182
Fish Market Surveys Made by Bureau of Fisheries 733
Fish Mouth Releasing Hook..... 479
Fish, Sea Water Ice for Packing..... 274
Fish, Small, Captured by Mussels on Ship Bottom 728
Fish—Trout, Roller Sieve Sorts into Sizes.. 900
Fishing, Artificial Showers for..... 645
Fishing Boat, Challenger, Launching..... 698
Fishing Boats, Sardine, Increase in Number and Efficiency of..... 245
Fishing, Deep-Sea, Anchored Barge Is Boon to 48
Fishing Industry Aided by Pigeons..... 387
Fishing Industry, Sea Lions Play Havoc with 674
Fishline, Spring Prevents Breaking of..... 485
Fittings, Air Craft, and What They are Made of 80
Fixing Bath Silver Recovered by New Process 230
Flag and Candle, Magic Trick..... 156
Flame Throwing Machine for Melting Snow 325
Flannel, Outing, as Emergency Oilstove Wicks 479
Flash Timing Arrangement for Making Radiographs 692
Flashboard Machine, Typewriter Student Aided by..... 696
Flashlight Batteries, Using Cheap..... 470
Flashlight Contained in Ladies' Handbag... 354
Flashlight for Seating Movie Theater Patrons 559
Flashlight, Hand, as Movie Film Projector.. 173
Flashlight in Back of Auto Glove for Signaling 253
Flashlights, Operation Completed by Doctor with Use of..... 923
Flight, Endurance, America Sets World Record for..... 380
Flight, North Pole, Amundsen to Attempt, by Lawrence W. Pedrose..... 875
Flight, Trans-Ocean, by H. H. Windsor.... 845
Flivvers, Fertilizer or, by H. H. Windsor... 519
Float Bridge Aids in Building Concrete Roads 882
Float, Corked Bottle as..... 485
Float for Nonswimmer Made in Animal Form 879
Flood Protection Stone Bags, Trees Grow from 872

Flood—River, Mexican, Harnessing a Treacherous 384
Flood Warnings, Amplifiers to Give, by H. A. Lane 9
Floor Covering, Advertising Stunt Tests.... 739
Floor Layouts, Rubber Stamps for..... 777
Floor Oils, Test Darkening Effects of..... 830
Floor, Sanitary Poultry House, Linoleum Makes 977
Floor Scraper, Improvised..... 481
Floor Tile, Antislip, Prevents Accidents.... 568
Floor, Vault, Lowered and Raised by Motor 186
Floors, Elephants Used for Testing..... 718
Flower Show, Huge Basket at Entrance of 238
Flower Vases, Rustic, How to Make..... 977
Flowered Reproduction of Snake on Roadside of Lonely Cottage..... 599
Flowerpot Stand, Guard for..... 151
Flowers and Candy, Neat Container for Sending 868
Flowers, Cut, Poppies as..... 806
Flowers, Glass Models of, at Harvard University 673
Flowers—Poppies, Growing Oriental..... 960
Flue Beading Tool, Rubber Retaining Ring on 757
Flue Hole Stop, Fireproof, Invisible on Wall Paper 917
Flux, Soldering, Containers for..... 800
Fly, House, Fingerprints of..... 253
Fly Trap, Sanitary Paper, Made Ornamental 862
Flying Cadets, Air Service Examinations to Appoint 979
Flying Service, Commercial, Starts in California 870
Fobs, Metal Watch, Making..... 648
Focusing Attachment for Folding Camera.. 522
Fog Signals, Wireless Controlled..... 236
Folding Bed Also Contains Wardrobe..... 603
Food, Cattle, Made from Sawdust by Chemical Process..... 863
Food Container, Water and Air Tight..... 273
Food Dehydration Apparatus for the Home 504
Food Mixer, Electric, for Medium Sized Kitchens 436
Food Products, Inert Gas Used in Canning.. 720
Food, Sanitary Vacuum Cabinet for Preserving 549
Foot Press, Seal Hand Press Made into..... 871
Foot Scraper, Homemade..... 960
Football Game, Ingenious Emblems at..... 206
Football Game Progress, Bulletin Board Shows 48
Footrail, Detachable, for Radiator..... 308
Force, Attractive Nonmagnetic, Discovered.. 915
Ford, John Anson:
Bungalette Camp for Motor Tourists..... 416
Hair, Structure of, Crime Mysteries Solved by 571
Scenery, Reversible, for Outdoor Theater 95
Foreign Money Orders, New Method of Rate Changes in..... 246
Foreign Trade Convention, National, to Increase American Exports..... 979
Foreigner Bureau Established in Minneapolis Post Office..... 276
Foreigners Allowed to Hold Land by Foreign Treaties 356
Forest Experiment Station Established in South 32
Forest Fires, Gasoline Speeder for Combating 566
Forest, New National, in Pennsylvania..... 356
Forest Rangers' Fire Engine Can be Carried on the Back..... 170
Forest Service, War Department Supplies Beds to..... 749
Forest, Alaskan National, Have Huge Timber Wealth..... 94
Forests, Dense Red Cedar, in British East Africa 764
Forge, Rivet, Oil-Burning Portable..... 106
Forgeries, Detection of, by Microphotography 754
Fork and Spoon Combination Tongs..... 766
Fork, Old, for Placing Small Screws..... 623
Form, Collapsible All Steel, for All Size Culverts 551
Form, Sliding Steel, for Concrete Canal Lining 535
Forms, Printers' Chase Simplifies Locking up 688
Fort Wayne, Growth of, Wall Size Maps Show 265
Fossils, Prehistoric Human, of New Type Discovered 190
Foundation Piers, Epoch Making Tests of, by Henry S. White..... 23
Foundation Tests, Union Station, Astonishing Results of, by Henry S. White..... 653
Foundation to Help Towns Establish Playgrounds 815
Foundry, Iron, South Georgia to Have..... 919
Foundry Sand Cutting Machine, Hand Propelled 534
Fountain, Artificial, Is Highest in the World 434
Fountain, Automatic, Serves Self-Mixed Drinks 743
Fountain, Decorative, in Molded Concrete.. 722
Fountain, Drinking, Attached to Fire Hydrant 632
Fountain, Drinking, Trench Helmet..... 148
Fountain Pen Check Protector Prevents Forgery 356
Fountain Pens, Electrically Heated Type Engraves 506
Fountain, Sanitary Drinking, Bottle Washer, and Filter Contained in Faucet Attachment 115
Fox Hounds, Specially Designed Auto to Carry 887
Frame for Building Made of Tubing..... 422
Frame, Tent, Rigid Collapsible, for Campers 604
Fraternal Building, Beautiful, for Fort Wayne 743
Freeman, Lewis R.:
Irrigation and Water Power Development to Restore the Holy Land..... 849
Jerusalem, Will the Lost Tribes Return to 659
Lighting the Mississippi..... 347
Freezer, Ice Cream, Holding Firm..... 807
Freezing Pipe, to Remove Faucet..... 636
Freight Cars, Refrigerator, Converted for Winter Use 769
Freight, Poison Gas Chambers Disinfect, by S. R. Winters..... 595
Freight, Tallying Machine Used in Handling 496
French, Furniture Aids in Teaching..... 172
Frog, Jumping, How to Make..... 485
Fruit and Vegetable Press, Rotary..... 931
Fruit—Apples, Ventilated Storage House for 938
Fruit—Apples Wrapped in Oiled Paper Stop Scald 738
Fruit—Banana Industry, Pacific Coast of Guatemala to Have..... 756
Fruit—Berry Picking Made Easy..... 962
Fruit Cakes, 60 Pound, Presented to Famous Persons 236
Fruit, Citrus, Treatment for, Makes Icing Unnecessary 704
Fruit—Date Harvesting Requires Skill and Agility 924
Fruit Dish Made from Trench Helmet..... 147
Fruit Distributing Machine Places Fruit in Several Compartments 446
Fruit Drying, Dehydrators Investigated for. 492
Fruit—Figs, Three Wheeled Platform for Gathering 386
Fruit—Grapes, Seedless, in Eastern and Northern States 166
Fruit Jar Caps, Removing Tight..... 469
Fruit Jar Sealer and Opener..... 438
Fruit Jar Wrench, Firm Grip..... 698
Fruit Peeling Machine Uses Caustic Soda Vapor 726
Fruit Trees, Protecting from Frost..... 812
Fuel—Coal Consumption in Steam Boilers.. 780
Fuel, High Grade, Lignite Can be Converted into 568
Fuel Measuring Tanks for Oil Consumption Tests in Engines..... 270
Fuel, Peat as, for Heating Furnaces..... 92
Fuel Pump Fits Any Barrel or Drum..... 694
Fuel, Wood, Efficiency of..... 130
Fuller's Earth for Clutch or Brake..... 804
Fumigation Chambers for Freight Trains, by S. R. Winters..... 595
Funeral and Story of the Unknown Hero.. 17
Funeral Honors of Unknown Hero, Electrical Achievements Signalize, John W. Kean 19
Funnel Tipping, Washer Prevents..... 481
Fur Durability Measured by New Device.. 428
Furnace, Automatic Electric, for Treating Steel Parts 694
Furnace Cement Repairs Fireplace..... 645

84 POPULAR MECHANICS INDEX, VOLUME XXXVII, 1922

Furnace Cleaning, Speedometer Shaft Aids in 304
Furnace, Electric Brass, Revolving Mold Table on 386
Furnace, Electric, Self-Adjusting Electrodes in 897
Furnace Flue Soot Remover, Cheap..... 313
Furnace Fuel, Powdered Peat as..... 92
Furnace Gases, Instrument Records Effects of Air in..... 73
Furnace Register, Combination Wall and Floor 253
Furnace Register Seat..... 157
Furnaces, Hot Air, Care of Pipe Coils in... 321
Furniture Aids in Teaching French..... 172
Furniture Panels, Sunken Joints in, Cause of 616
Furniture, Roller Skate Aids in Moving.... 973
Furniture, Short Legged, Caster Cup for Leveling 768
Furniture:
Bed, Folding, Also Contains Wardrobe... 603
Chair, Adjustable Metal, for Workers.... 522
Chair, Bed, Bookshelf, and Medicine Cabinet in One 201
Chair, Device Easily Adjusts Height of... 251
Chair, Rocking, Felt Tires for:..... 642
Crib, Baby, Also Contains Wardrobe..... 438
Davenport Convertible into Bed..... 114
Doll House Furniture, Lead, How to Make 809
Kitchenette for Small Apartments..... 414
Porch Swing, Adjustable, for Various Positions 767
Table and Bed in One..... 185
Table and Chairs, White Enamel, for Children 445
Table, Collapsible, Can be Folded into Small Space 115
Table, Kitchen, Contains Two Washtubs and Boards 114
Table, Knockdown, for Breakfast or Ironing 439
Table, Ornamental Porcelain, Folds Against Wall 273
Table Top, Inlaid, Made of Thousands of Pieces of Wood 915
Table Top, Ornamental, Made of Steel Tubing 715
Toilet Cabinet for Bathroom..... 931
Umbrella Stand Made from Trench Helmet 147
Fuse Plug, Blown Out, Temporary Repair for 472
Fuses, How to Bridge..... 807
Fuses, Open, Alarm Circuit for..... 794
Fusible Plug, Overheated Air Compressor Stopped by 868

Gaines, Cleveland: Cement Shooting Gun for Coating Houses 361
Gallery, Toy Shooting..... 445
Galvanized Coatings, Testing Device Weighs 235
Galvanizing, Brass and Copper..... 301
Gambrel, Simple Skinning 322
Games:
Baseball Game Called on Account of Alaskan Tide 552
Baseball Game, Indoor..... 642
Baseball, Indoor, with Penknife..... 146
Baseball Scene, Wood, Whittled with Knife 254
Billiards, National Association to Encourage 652
Bridge Playing of Skill Only, New Cards Make 440
Chess Trick, Knight's Tour..... 648
Football Game, Ingenious Emblems at.... 206
Football Progress, Bulletin Board Shows. 48
Golf Course, Nine Hole, with Unusual Hazards, by H. A. Lane..... 67
Golf, Water, Played from Boat..... 742
Phonograph Disk, Cardboard, Eight Games Played on 367
Pushball Affords Novel Entertainment at Carnival 62
Pushball Game, Boy Scout, in San Diego, Calif. 280
Shamrock Snake Game..... 121
"Shoveha' Penny" Board, Improved..... 383
Tennis Courts, Cement, Laid with Permanent Lines 388
Tennis Playing on "Pogo Sticks"..... 332
Gantry Drilling Machine for Plates..... 97
Garage, Abandoned Church Utilized as..... 886
Garage Air Hose, Coin Operated..... 423
Garage and Apartment for Auto Tourists.. 918
Garage, Basement, for Office Building Tenants 921
Garage Door Automatically Opens by Weight of Car 364
Garage Doors Locked Any Position by Toggle 278
Garage Equipment Replaces Repair Pit..... 529
Garage Has Road Test Rack for Autos..... 73
Garage Roof Utilized as Shop..... 404
Garage Zoning Regulations Tested by Application 173
Garages, Air Pressure Grease Lubricating Device for 429
Garbage Can, Two Shell, Disinfects Refuse. 277
Garden Hoe, Double Action..... 969
Garden Hose Connections, Improvised Washers for 977
Garden Mulcher, Novel, How to Make..... 813
Garden, Rose, for Portland, Oregon..... 109
Garden Seat, Double, with Awning..... 122
Garden, Terrace Summer, for Governor of Philippines 63
Garden Weeding Seat Prevents Backaches.. 6
Garments of French Modiste Marked to Prevent Counterfeiting 440
Garter, Radio, Latest Fad for Wireless Fans 710
Gas and Oil Royalties on Government Owned Land for 1921..... 726
Gas Blowpipe, Homemade..... 614
Gas Burner, Adjustable Height..... 904
Gas Burner, Adjustable Height, Reduces Gas Consumption 498
Gas Burner for Heating Incubator..... 636
Gas Burners in Oil Field Boilers, Efficiency Test for 551
Gas—Carbon Monoxide Poisoning, First Aid for 552
Gas Causes Explosion and Fire When Struck by Auto 505
Gas Chambers, Poison, Disinfect Freight, by S. R. Winters..... 596
Gas Control Regulated for Operation of Torches 118
Gas Controller, Automatic Electrical..... 939
Gas, Deadly War, Made into Perfume..... 87
Gas for Cooking being Installed in Canal Zone Quarters 730
Gas Heater, Wall Pocket, Sets Flush with Wall 832
Gas, Hydrogen, Sulphur Removed from Coke with 583
Gas, Inert, Used in Canning Food Products. 720
Gas Iron as Soldering Bit Heater..... 322
Gas Lamp, Incandescent, Soldering Blowpipe Made from 958
Gas Made at Coal Mines to Solve City Fuel Problems 818
Gas Main "Sweat," Collecting from Drip Wells 897
Gas Meter, Venturi, Largest Ever Built..... 669
Gas, Natural, "Wild" Wells Cause Great Loss of 916
Gas, New Noninflammable, Produced for Airships 906
Gas Pistol Repels Fire or Burglars..... 237
Gas, Poison War, Rattlesnakes Killed with 204
Gas Producer, Truck, Charcoal as Fuel for. 576
Gas Range Has Novel Burner and Cast Iron Top 588
Gas Sampler, Automatic, for Mine Explosions 530
Gas Selling by Heat Value as Well as Volume 390
Gas Tank, Colossal, Holds 15,000,000 Cubic Feet 32
Gas, Tar in, Rapid Method of Determining Amount of 686
Gas, Tear, to Aid Police as Emergency Measure 515
Gas Torch, Natural, Is Economical..... 601
Gas Tubing, Metal End for, Fits Any Hose Connection 363
Gas Water Heater, Electrical Control for... 381
Gas Water Heater, Upper Floor Control for 314
Gases, Explosion of, Soap Bubbles Used to Study 910
Gases, Furnace, Instrument Records Effects of Air in..... 73
Gasket Lock Joint..... 131
Gaskets, Cork Auto, Holder Protects..... 973
Gaskets, Cylinder Head, Locating..... 942
Gasoline Atomizer for Gas Engines..... 436
Gasoline Calculator, Price and Quantity.... 138

Gasoline Efficiency, Waste Product May Raise 504
Gasoline Measuring Tanks for Consumption Tests of Engines 270
Gasoline Removes Asphalt from Concrete by Burning 184
Gasoline Station Hose, Swivel Joint for 375
Gasoline Tank Cars, Pressure Inside of, Greater When Standing 500
Gasoline Tanks, Auto, Emptied by Suction Pumps before Shipping 78
Gasoline Tanks, Auto, Self-Acting Filling Cap for 600
Gasoline, Test for Water in 315, 482
Gassing Bad Odors, by Harry A. Mount 219
Gate Arbor Made from Wagon Wheel 645
Gate, Beehive, Passes One Bee at a Time 723
Gate, Elevating End, Attached to Motor Truck 877
Gate Stop, Simple 647
Gate, Vehicle, for Driveway 810
Gates, Sidewalk Elevator, Prevent Accidents 8
Gateway, Attractive Highway, Warns Motorists of Town 434
Gauge, Accurate Cylinder, with Registering Dial 764
Gauge, Depth, Scale Used as 949
Gauge for Dividing Circles 627
Gauge for Grinding Milling Cutters 616
Gauge for Laying Out Square Holes 612
Gauge for Measuring Oversize in Cylinders 750
Gauge for Milling Hexagons 783
Gauge for Sharpening Gravers 140
Gauge for Sizing Small Machine Work 776
Gauge Glasses, Cleaning Water 306
Gauge Glasses, Safety Container for 449
Gauge, Simple Internal, How to Make 784
Gauge, Snap, Measures Errors in Size Exactly 681
Gauge, Taper Turning 627
Gauge Tests Compression Loss in Motor Cylinders 430
Gauge, Thread, Holder for Protecting 952
Gauge, Tire, Also Contains Valve Tools 134
Gear Puller, Screwjack 481
Gears, Internal, Vertical Shaper Modified to Cut 759
Gears, Toy Worm, How to Make 480
Geese, Shipment of, Stimulate Barter Trade Between England and Poland 25
Geese, Wild, Electric Storm Electrocutes 75
Geiger, Charles W.:
Cocoanut Oil Butter, How Manufactured 262
Community Center at Isolated Power Plant 888
Generator, Airplane Wireless, Driven with Single Blade Propeller 865
Generator and Magneto Testing Base 950
Generator, Motor, in Automatic Substation of Coal Mine 264
Generator, Transformer, and Motor Testing, Part I—Motors 289
Generator, Transformer, and Motor Testing, Part II—Generators and Transformers 456
Generator, Windmill, Stores Electricity for 11 Days' Use 254
Generators, Motor, Driving Unit for Banding 455
Geology, Boy Scouts Have Fireplace for Study of 94
Germ Killing Dyes, Experiments in Production of 834
Germs, Milk, Counted by Economical Process 240
Ghosts Revealed to be Nothing but Chiffon 693
Girl, Blind and Deaf, Develops Wonderful Sense of Touch and Smell, by Fred L. Holmes 13
Girl, Little, is Real "Alice of Wonderland" 937
Girls, India, Arrive in London, Eng. to Broaden Education 444
Glass and Bottle Washer, Electric 36
Glass, Art, as Showcards 471
Glass Burial Caskets 82
Glass, Cutting with Soldering Bit 453
Glass Mail Box Makes Letters Visible 718
Glass Models of Flowers at Harvard University 673
Glass, Research Work on, American Ceramic Society Offers Aid in 815
Glass, Sheet, Rack for Storing 451
Glass, Soft, under Pressure to Eliminate Bubbles 364
Glass Studio, Large, Delicate Operation of Moving 561
Glass, Tinted, for Producing Artificial Daylight 674
Glass, Unbreakable, Now Produced 924
Glass, Unbreakable, Produced in Bohemia 686
Glass, Water Gauge, Cleaning 306
Glasses, Attachment for, Aids Marksmen 469
Glasses, Gauge, Safety Container for 449
Glasses, Liquid Contained, Electric Heating Cup for 115
Glider, Astonishing Results Made with 212
Glider Makes Remarkable Flight in Switzerland 819
Glider, Motorless German, Shows Great Stability 505
Glove, Auto, Has Flashlight in Back for Signaling 253
Glue, Casein, Copper Salts Increases Resistance to Moisture of 874
Glue Pot, Deodorizing 136
Goddard, Charles A.: Stove Business, Prosperous, from Salvage 83
Gold Coins Returned to Circulation 112
Gold Medal Commemorates Defenders of Verdun 326
Gold Mine Rock Bursts Experimentally Prevented with Use of Cement Spray Gun 415
Golf Bag Holder Clamps to Auto Running Board 175
Golf Course, Nine Hole, with Unusual Hazards, by H. A. Lane 67
Golf Course Sprinkler, Rubber Rollers on 716
Golf—Gun Make Tees Any Desired Height 116
Golf Seat, Double, Protected by Awning 122
Golf, Water, Is Latest Fad for Pleasure Seekers 742
Goodwin, Wm. B.: Island Made from City Refuse 740
Gopher Trap, New Type, Makes Record Catch 206
Government Information by Wireless Telephone 382
Government Land Seekers Sit Three Weeks in Cold to Register 193
Government, Self, Practiced by Department Stores 933
Governor, Philippine, Terrace Summer Garden for 63
Grader, Gasoline, Cuts Eight Inch Trench 703
Grader, Tractor Road, Simple and Economical 413
Graders, Two Road, Pulled Abreast by Tractor 371
Grain, Century-Old Grinding Mill Still Grinds 826
Grain—Corn, Monster Ear of, 30 Feet High 223
Grain Elevator, Huge, to be Constructed at Montreal, Canada 589
Grain Elevator Screenings, Sheep Fattened on 586
Grain Loader, Bulk, Simple Inexpensive 68
Grain Raising on a Lake Bottom, by Fred S. Walker 395
Grain Scoop Made from Washboiler 469
Grain—Wheat Cleaning Machine for Use with Thresher 689
Grand Opera, Actual, Phonograph Records Made of 42
Grand Pianos, Three Section Top Lid for 830
Granite Clubhouse for Elk Tourists 109
Grapes, Seedless, in Eastern and Northern States 166
Grass Carrier, Lawn Mower, Works on New Principle 714
Grass Rugs, Rejuvenating 799
Grates, Engine, Made from Old Tires 124
Gravel in Concrete Mixtures 299
Gravers, Gauge for Sharpening 140
Grease Cup as Container for Soft Soap 941
Grease Cup, Wick Feed Oiler Made from 459
Grease Gun, Laundry Siphon Made from 315
Grease in Boilers, Action of 615
Grease Lubricating Device, Air Pressure, for Garages 429
Greases, Gun, Making 285
Griddle, Hollow Base, Distributes Heat Evenly 767
Grimshaw, Robert: Sugar Cane, Machine Harvests 494
Grinder, Automatic Belt Shifter for 942
Grinder, Light, and Switch Combined 453

Grinder, Small Turbine Type, Has High Speed 249
Grinder, Valve, Made from Hand Drill..... 140
Grinding Ball Check Valve Seats..... 301
Grinding Device, Motor Driven, Also Drills and Buffs 568
Grinding Holes Straight..... 568
Grinding Mill, Century-Old, Still Grinds Grain 826
Grinding Odd Size Piston Rings..... 791
Grinding Outfit, Bicycle, Has Many Features 303
Grinding Troubles Remedied 788
Grinding Wheels, New Safety Code Pertaining to 765
Grip, Rubber Pencil, Prevents Slipping..... 890
Grippers Aid in Sawing Wood..... 297
Groceries, Barge System for Shipping..... 98
Grommet Die, Simple..... 638
Grooves, Worn Shaft, Repairing..... 136
Guard for Flowerpot Stand..... 151
Guard for Machine Rolls..... 781
Guard Plate for Knife Switch..... 943
Guard Prevents Dulling of Hoe..... 973
Guard, Sidewalk Elevator, Prevents Accidents 8
Guards, Dust, for Eccentric Straps..... 615
Guards for Milling Machine and Punch Presses 454
Guide, Improved Belt, for Long Belts..... 879
Guide, Key, for Door Locks..... 973
Guide, Spring, for Circular Saw..... 464
Gum Vending Machines, Street Car, in Little Rock, Ark. 108
Gun Barrel, Polishing Bore of..... 472
Gun, Cement Shooting, for Coating Houses, by Cleveland Gaines..... 361
Gun, Cement Spray, Rock Bursts in Metal Mines Experimentally Prevented with Use of 415
Gun, French, without Recoil Has Increased Power 524
Gun, Grease, Laundry Siphon Made from... 315
Gun Greases, Making 285
Gun Life Line, Fired from the Shoulder.... 1
Gun Locks, Repairing 971
Gun—Machine Gun, Centrifugal Force..... 389
Gun—Machine Gun, Power Driven, under Development 686
Gun Makes Golfing Tees Any Desired Height 116
Gun—Pistol, Fire Extinguishing, Also Repels Burglars 237
Gun—Pistol, 20 Gauge Shot, by Capt. Edward C. Crossman..... 405
Gun—Popgun, Water 469
Gun, Projectile, Is Life Saving Appliance... 728
Gun—Revolver, 16 Shot, Made in Belgium.. 261
Gun—Rifle Recoil Pad, Military, Passes Severe Tests 340
Gun—Shotgun, Making Comfortable..... 649
Gusher, Oil, Damages Residential Part of City 887
Gusher, Oil Men Strike "Gasser" Instead of. 8
Gutter Brush for Removing Refuse..... 796
Guy Wire Slack Puller Replaces Block and Tackle 890

Hacksaw Blades as Core Box Facing..... 942
Hacksaw, Special Slotting..... 615
Hacksaw Vise, Adjustable Block for..... 953
Hair Clipper, Electric, Has Motor Installed in Handle 394
Hair Drier, Electric, How to Make..... 143
Hair Marcelling Iron, Electric..... 273
Hair, Structure of, Crime Mysteries Solved by, by John Anson Ford..... 571
Hammer Holder, Belt Loop..... 463
Hammer, Inverted Steam, Drives Piling Upward 560
Hammer, Patternmaker's, How to Make.... 625
Hammer, Power, for Farm Shops..... 611
Hammer, Soft Faced Flogging, Has Mold for Refacing 736
Hammock and Swing, Adjustable Position.. 767
Hand Drier, Electric, Built in Wall..... 442
Hand Drill, Valve Grinder Made from..... 140
Handbag, Ladies', Flashlight Contained in.. 354
Handcar, High Speed, Built by Section Foreman 52
Handle, Emergency, for Washing Machine.. 805
Handle, Plane, Made Adjustable..... 142
Handle, Strong Lawn Mower, How to Make..974
Handle, Tool, or Pin Vise, Simple..... 626
Hanger, Adjustable, for Wall Radiators.... 404
Hanger, Trouser, Holds Garment from Inside 767
Hangers, Infant Clothes, Notched Pole for Holding 114
Hanna, G. Dallas: Ivory Carvers of Bering Sea 761
Hanna, Phil W.: Arsenic Mining and Refining in Virginia..... 79
Harbor — Dock, New Type, for Loading Barges 232
Harbor Pollution, Bilge Stations to Prevent 166
Harness, Single and Double, Combination.. 641
Harrow Plows and Pulverizes in One Operation 861
Harvester, Kafir Corn, Heads Two Rows Simultaneously 490
Harvester, Rice, Collects Rice from Standing Stalks 692
Harvester, Sugar Cane, by Robert Grimshaw 494
Harvester Thresher, Combined, Motor to Operate 774
Hasp, Preventing from Breaking..... 953
Hasp Staple, Hardened, Prevents Sawing.. 142
Hats, Electric Iron for..... 602
Hausman, Leon Augustus: Animal, Capturing the Smallest in the World..... 69
Hay, Newly Mown, Dried by Electricity.... 594
Hay, Stacking by Gravity..... 948
Hay Stacking Machine Saves Time and Labor 71
Hay, Windlass Holds Firmly on Truck.... 956
Header for Kafir Corn..... 781
Header Thresher, Combined, Proves Economical 597
Headlight, Auto, Electric Heater Made from 471
Headlight Glare Dimmer Protects Driver.. 41
Headlight, Rear Auto, for Backing..... 218
Headlight Shield Aids Auto Driving at Night 894
Headphones, Four Sets of, on Wireless Telephone Device 834
Heat Treatments, Electric Apparatus for Giving 520
Heater and Toaster, Combined Electric..... 439
Heater, Electric, for the Sick Room..... 766
Heater, Electric Manifold, for Cold Engines 266
Heater, Electric Water..... 356
Heater, Electric Window, Prevents Frost.. 725
Heater, Gas Water Tank, Electrical Control for 381
Heater, Gas Water, Upper Floor Control for 314
Heater Made from Auto Headlamp..... 471
Heater, Oil-Burning 151
Heater, Small Electric, Possesses Many Merits 701
Heater, Small Room, Burns Alcohol..... 931
Heater, Soldering Bit, Gas Iron as..... 322
Heater, Stovepipe, Made from Old Tank.... 321
Heater, Wall Pocket Gas, Sets Flush with Wall 832
Heaters, Odd Departure in, Used in Switzerland 847
Heating Device, Carburetor, Makes Auto Starting Easy 534
Heating, Personal, Possible Is Theory of Englishman 726
Heating Plant, Central, Planned in Tokyo.. 524
Heating Plants, Small, Heavy Oil Burner for 251
Heels, Snap-On Rubber..... 390
Helium Inflated Dirigible, First Flight of.. 230
Helmet, Shallow Water Diving..... 222
Helmets, Steel Trench, Utilizing..... 147
Hen Mothers Little Ducklings..... 937
Hens, Laying, are Trapped in Automatic Nest 30
Hermit Sells Sea Life to Movie Firms..... 91
Hero Honors, Unknown, Electrical Achievements Signalize, by John W. Kean..... 19
Hero, Unknown, Story of..... 17
Herring Weir Model Built by Maine Fisherman 403
Hexagons, Gauge for Milling..... 783
High School Students Offered University Scholarship for Good Road Essays..... 815
Highway, Amount of Concrete, Laid in 1921 354
Highway, Ancient Mountain, becomes Modern Railway 879
Highway Built on Sandy Shore Uses Sectional Planking 589

Highway, Columbia River, Icebound, by H. E. Thomas 216
Highway Construction, Cost of 432
Highway Gateway, Attractive, Warns Motorists of Town 434
Highway Grader, Gasoline, Cuts Eight Inch Trench 703
Highway Maintenance Plan, New, Suggested in Manitoba 552
Highway Pedestrians, Safety First Cards Teach 122
Highway Signs, California, Protected by U. S. Forest Service and State Auto Association 380
Highway Signs, Richmond's Auto, Warns and Invites 108
Highway Signs, State Trunk, Have Numbers 109
Highway Snow Shoveler, Mechanical 585
Highway Tests Made with Tunnels beneath Roadway 86
Highway, Wisconsin State, Wayside Shrine on 926
Hinge, Door, Protects Fingers from being Mashed 768
Hinge, Screen Door, Permanent Fastenings for 972
Hinge Screws, Accurate Holes for 141
Hinges, Automobile Mudhooks Made from .. 969
History Essays, American, Prizes Offered for 487
History, Motion Picture Films in Schools to Teach 882
Hoe, Garden, Double Action 969
Hoe, Guard Prevents Dulling of 973
Hoffmann, A. M.: Torch Cuts Cast Iron in Fifty Feet of Water 681
Hog Raising Clubs Aids Indiana Farmers ... 652
Hoist and Air Compressor on One Support .. 922
Hoist, Auto, Replaces Repair Pit 529
Hoist, Lightweight Portable, Has Great Lifting Capacity 432
Hoist, Road Tractor as, to Raise Sand from Beach 551
Hoist, Simple Farm 312
Holder, Artists' Magnifying Glass 465
Holder, Belt Loop, for Hammer 463
Holder, Broom, Made from Shoehorn 317
Holder, Calciminer's Brush 137
Holder, Carriage Bolt 947
Holder, Developing, for Cut Films 468
Holder, Dishcloth, for Washing in Hot Water 602
Holder, Electric Iron Cord, Clamps to Board 602
Holder, Faucet Kettle 114
Holder for Auto Crankcase Bolts 138
Holder for Demountable Rims 804
Holder for Protecting Reamers 629
Holder for Small Thread Gauge 952
Holder for Transplanting Young Trees 415
Holder, Golf Bag, Clamps to Auto Running Board 175
Holder, Improved Toothpaste-Tube 402
Holder, Knurl, Fits Lathe Toolholder 942
Holder, Medicine Dropper, Attachable to Bottle 960
Holder, Novel Tap, for Drilling Machine 955
Holder Protects Cork Auto Gaskets 973
Holder, School Desk Book, Made of Bent Iron Wire 692
Holder, Simple Scale 624
Holder, Tag, Holds Numerically 130
Holder, Teapot Lid, Also Prevents Spout Dripping 600
Holder, Telephone, Fits Top of Coin Box .. 492
Holder, Telephone Slug, Handy 273
Holder, Thermometer, for Bed Is Handy and Sanitary 725
Holders, Simple Price Tag 805
Holding Board, Copy, Simple 600
Hole, Broach, Should be Drilled or Bored .. 955
Hole, Drilling in Porcelain 613
Hole, Square Bottom, Counterbore for 138
Hole Stop, Flue, Is Fireproof and Invisible .. 917
Holes, Accurate, for Hinge Screws 141
Holes Accurately Sized with Round Broach 135
Holes, Grinding Straight 953
Holes, Horizontal, Drilled Accurately 790
Holes in Tanks, Soldering 473
Holes, Square, Gauge for Laying Out 612
Holes, Tapping in Thin Tubing 782
Holes, Test Drill, Interesting Process of Surveying 912
Holiday, Naval, Jingoes and the, by H. H. Windsor 519
Holmes, Fred L.: Girl, Blind and Deaf, Develops Wonderful Sense of Touch and Smell 13
Holy Land, Water Power Development to Restore, by Lewis R. Freeman 849
Holy Land, Will the Lost Tribes Return to, by Lewis R. Freeman 659
Home Port Plates for Autos Popular 62
Home Yards, Beautiful, Prizes Offered for .. 487
Homes, Fort Wayne, Indiana, Families Build Own 100
Hood, Lens, Made from Drinking Cup 960
Hoods, Auto, Stand for Painting 615
Hook, Brush, Made from Shovel 976
Hook for Pulling Straw from Stack 486
Hook, Releasing, for Fish's Mouth 479
Hooks, Screw, Screwdriver Attachment for inserting 947
Hoosier Ton Litter Club Aids Indiana Farmers 652
Hoppers, Gas Engine, Float Valve for 638
Hoppers, Gas Engine, Preventing Water Slopping in 631
Horn, Auto, Gives Alarm When being Stolen 974
Horn Calls Boosters' Meeting to Order 242
Horn Detects Nature's Faint Sounds 578
Hornet, Driving from Nest 810
Horoscope Prize for Lucky Name 651
Horse, Artificial Nose in Neck of 935
Horse Boards Steamer in Special Stall 77
Horse Defeated by Movie Athlete in Foot Race 232
Horse, Kiddie, How to Make 968
Horse Show, New Kind of, by Frank B. Howe 12
Horse Statue, Famous, Cast in Bronze 101
Horses, Auto Trailer for Transporting 43
Horseshoe Shaped Barn on Missouri Farm. 104
Hose Cap, Gas, Fits Any Size Connection ... 363
Hose, Coin Operated Air, for Garages 423
Hose Connections, Garden, Improvised Washers for 977
Hose Coupler, Automatic, for Railroad Cars 71
Hose Faucets, Preventing Use of 971
Hose, Gasoline Station, Swivel Joint for 375
Hose Stored in Basement Window 634
Hose Support Prevents Kinking 439
Hose Supporters, Adhesive Tape as 642
Hospital Appliances:
Carrier, Invalid, Removes Patient from Bed Painlessly 498
Heat Treatments, Electric Apparatus for Giving 520
Hospital, Farthest North, Building the, by Lawrence Wm. Pedrose 49
Hospital, World's Largest Fireproof 58
Hot Plate, Electric, for Toasting and Heating 272
Hotel being Built Over Paris Jewelry Store 89
Hotel Chambermaids, Bed Making Contest for 858
Hotel, New Chicago, to Have Bungalows on Roof 914
Hotel, New York Apartment, to House Church 731
Hotel, New York, Has Moorish House Beside It 218
Hotels, Motor, by H. H. Windsor 29
Houk, Ivan E.: Concrete Paving, Flexible, Protects Levees 220
House—Booth, Portable Lunch, on Ice Skating Rink 499
House Built of Telephone Poles 542
House—Bungalow Furnishing, Prize Offered for 159
House, California Log, Artificial Icicles Adorn 545
House—Clubhouse, Granite, for Elk Motorists 109
House—Comfort Station, Auto Tourists', at Mason City, Iowa 598
House Commemorates Discovery of Gold in California 434
House, Concrete Wall Adds to Warmth of. 806
House Cut in Two to Meet House Shortage 365
House, Elaborate, for Auto Touring 160
House—Garage and Apartment for Auto Tourists 918
House Has Camouflage Furniture and Conveniences 258

House, Miniature, Made of Candy..... 772
House, Moorish, Built Beside New York Hotel 218
House Moving Enterprise Stopped and Wrecked 257
House Number on Curb to Guide Motorists 906
House, One Room, Has Rooms in Walls, by Frank B. Howe..... 209
House, Tool, Carried Across River by Aerial Cableway 493
House, Trees Grow through Roof of..... 546
House, Ventilated Storage, for Apples..... 938
Household Devices, 114, 272, 438, 602, 766, 930
Household Expenses, Best Management System of, Prizes for..... 980
Houses, Apartment, to be Wired for Radiotelephones 738
Houses, Cement Shooting Gun for Coating, by Cleveland Gaines..... 361
Houses, Fireproof Concrete, Built Economically 676
Houses, Fort Wayne, Indiana, Families Build Own 100
Houses, Small Apartment, Steel Kitchens for 934
Houses, Tourists' Camping, at Fergus Falls, Minnesota 109
Houses, 600, "No Man's Land" at Rheims Contains 935
Howe, Frank B.:
Balloon Control to Observers, Teaching.. 225
Dam, Great California, Proves Success.. 368
Horse Show, New Kind of..... 12
House, One Room, Has Rooms in Walls.. 209
Hulls, Rice, Converted into Useful Products 66
Hulls, Wooden Ship, for Pontoon Bridge.... 565
Humidity Readings at a Distance, Instrument Gives 116
Humidor Compartments in Cigar Store for Customers 166
Hunter's Skinning Knife Prevents Cutting Hides 658
Hunting Dogs, Cage on Auto Running Board for 171
Hunting, Whale, on the Top of the World, by Lawrence Wm. Pedrose..... 167
Hut, Hunting and Fishing, on Cedar River, Washington 269
Hydrants, Fire, Protected from Snow..... 158
Hydroelectric Development in Arkansas, by Tom Shiras 574
Hydroelectric Development in Netherlands Indies 546
Hydroelectric Plant for Remote Workers' Colony 593
Hydroelectric Plant, Huge Canadian, Completed at Niagara..... 326
Hydroelectric Plant on Skagit River Projected 342
Hydroelectric Plant, Vermont, First Step in Development of..... 536
Hydroelectric Power and Irrigation, Sardinia Artificial Lakes for..... 231
Hydroelectric Power Development to Restore Holy Land, by Lewis R. Freeman.. 849
Hydroelectric Power Project, Italian, Old Lake Bed as Storage for..... 712
Hydroelectric Station, New, in Valencia, Spain 848
Hydrogen Gas, Sulphur Removed from Coke with 583
Hydroglider, Japanese, for Travel on Water 907
Hydroglider, Speed and Comfort Feature, by Henry S. White..... 243
Hydrometer, Stick, for Measuring Percentage of Alcohol in Auto Radiators..... 126

Ice and Roller Skating on Reservoir Cover. 412
Ice Boat, Exciting Moment in a..... 207
Ice Boats Rival Speed of Hydrogliders..... 490
Ice Cream Freezer, Holding Firm..... 807
Ice Cream Machines, Sanitary Economical.. 81
Ice Cream Temperatures, New Apparatus for Taking 566
Ice Floated Across River by Cable Ferry System 192
Ice Harvesting, Power Driven Circular Saw for 214
Ice Harvesting, Railroad, in the Mississippi, by F. L. Clark..... 373
Ice Lamp Post, Storm Reproduces..... 356
Ice Machine Condenser, Increasing Efficiency of 632
Ice Plant, Home, Simple and Noiseless..... 823
Ice, Sea Water, for Packing Fish..... 274
Ice Skating Rink, Portable Lunch Booth on 499
Ice, Wreath Incased in, Sent from Antipodes to England 231
Ice Yacht, Building a, Part II—Spars, Rigging and Assembling..... 152
Icicles, Artificial, Adorn California Log House 545
Identification and Detection Means, Improvement in 72
Identification Mark on Tires..... 318
Ignition, Auto, Secondary Condenser Improves 748
Ignition System, Auto, Kept Dry with Newspaper 641
Ignition System, High Class, for Low Priced Cars 764
Ignition Tester, Auto..... 288
Illumination Meter, Portable Accurate..... 346
Illumination, New Years, of Philadelphia City Hall 370
Improvement Funds, Motion Pictures Gain Grant of 673
Income Taxes, A Few Pay the, by H. H. Windsor 846
Incubator Egg Tray Turns All Eggs at Once 714
Incubator, Electric, Regulated by Thermostat 578
Incubator, Gas Burner for Heating..... 636
Incubator Used as Oat Sprouter..... 146
India Girls Arrive in London, Eng., to Broaden Education 444
Indian "Copyright Law" Concerning Totem Poles, by Francis Dickie..... 898
Indians, Ancient Inca, Copper and Zinc Ax Head Is Relic of..... 743
Indians, Argentine, Crowded Out of Old Haunts 227
Indians, Chiapas, Pose for Camera..... 214
Indians Give Massasoit Statue to Plymouth, Mass. 324
Indicator, Automatic, Tells Direction of Engine 282
Indicator, Electrical, Carbon Dioxide Measured by 76
Indicator for Recording Shape Irregularities 240
Inert Gas Used in Canning Food Products. 720
Information Bureau, Foreigner, Established in Minneapolis Post Office..... 276
Inhalation Outfit of New Design..... 726
Ink Equalizer for Printing Press..... 718
Ink, Testing for Acid..... 952
Inner Tubes Aid Corn Shucking Workers... 636
Inner Tubes as Tires for Wooden Wheels... 643
Inner Tubes, Rubber Mat Made from..... 649
Insect and Weed Exterminating Machine... 423
Insect Corn Borer, Investigate Migration of 908
Insect—Moth Messages, Scientist Study, by L. D. Lotton..... 711
Insects—Mosquitoes, Rabbits as Protection from 162
Insects, Trees Protected from..... 805
Inspection Car, Lightweight Railroad..... 544
Instrument Makers, Civil Service Examination for 487
Insulating Material, Synthetic, Italy Develops 377
Insulating Mats, Asbestos, Have Many Advantages 703
Intermittent Motion, Correct Design Movement for 452
Internal Gauge, Simple, How to Make..... 784
Invalid Carrier Removes Patient from Bed Painlessly 498
Invalid's Wheelchair, New Conveniences for 436
Inventor, Lifeboat, Centenary of Death of.. 116
Iron, Cast, Cut by Torch in 50 Feet of Water, by A. M. Hoffmann..... 682
Iron Cord Holder, Electric, Clamps to Board 602
Iron Corrosion, Preventing, in Manufacture of Sal Ammoniac 878
Iron, Electric, as Vulcanizer 306
Iron, Electric, for Ironing Hats..... 602
Iron, Electric, Indicating Switch for..... 305
Iron Foundry, South Georgia to Have..... 919
Iron, Gas, as Soldering Bit Heater..... 322
Iron, Hair Marcelling, Electric..... 273
Iron, High Grade, Produced from Magnetic Sand 66
Iron Pistons Made Light by Skillful Design. 680
Iron, Rustproofing 465

Iron Silicon Alloy Melted by Chemical Heat 560
Iron, Working Heated 453
Ironing Board Can be Clamped to Table 115
Ironing Board, Small Apartment 158
Irons, Campfire, Nails as 800
Ironwork, Ornamental, Cutting Torch Produces 787
Irregularities, Shape, Shown by Dial Recorder 240
Irrigated Land, Hardening of, Makes Cultivation Difficult 432
Irrigation, Abandoned Land Reclaimed by, by Horace E. Thomas 197
Irrigation and Electric Power, Sardinia Artificial Lakes for 231
Irrigation and Water Power Development to Restore the Holy Land, by Lewis Freeman 849
Irrigation and Water Supply Projects in Canada 680
Irrigation Dam, New, of Multiple Arch Type 102
Irrigation Ditch Screen Keeps Fish Out 117
Irrigation Project, Chinese Merchants Start 217
Irrigation Water, Gravelly Soil in California Used for Storing 920
Island—Kauai, How Lumber is Transported to 729
Island Made from City Refuse, by Wm. B. Goodwin 740
Island Manhattan, Six Mile Extension Planned for 64
Island—North Island, Calif., to be Air Craft Base 353
Island Once Barren Now Clothed with Vegetation 774
Island, South Georgia, to Have Iron Foundry 919
Island Wireless Station Is Norway's Weather Outpost 185
Islands, British Columbia, Radium Bearing Minerals Found on, by Francis Dickie 235
Ivory Carvers of Bering Sea, by G. Dallas Hanna 761

Jack and Tire Rim Contractor, Combined 911
Jack, Automatic Auto, Controlled from Driver's Seat 696
Jack for Replacing Auto Spring Hanger Bolts 484
Jack Made from Axle Housing 131
Jack, Pin Bushing, Prevents Distortion of Pistons 951
Jack, Pump, Repaired for Engine Drive 782
Japanese, American Born, May Own Land 736
Japanese Crown Prince, Return of, Celebrated by Great Fireworks Display 374
Japanese Prince, Bronze Medal Commemorates Trip of 586
Japanese Women's Peace Plan 300 Feet Long 2
Japanese Wood Carver Cuts Lifelike Statue 312
Jar, Fruit, Sealer and Opener 438
Jaw, Adjustable, for Hacksaw Vise 953
Jelly Tumbler Covers Open by Pressure in Center 439
Jerusalem, Will the Lost Tribes Return to, by Lewis R. Freeman 659
Jet Mine, Utah, Gives Promise of Coming Industry 427
Jewelers' Camera Produces Exact Size Pictures 894
Jewelry, Soldering 134
Jewelry Store, Paris, Hotel being Built Over 89
Jewelry:
  Watch Charm, Land Elevations of Nation Shown in 696
  Watch, Largest, Exhibited at Washington 545
  Vanity and Watch Case, Equipped 272
Jig Clamp, Quickly Operated 943
Jig Clamp, Rapid, How to Make 794
Jig, Universal Alinement, for Crankshafts and Pistons 77
Jingoes and the Naval Holiday, by H. H. Windsor 519
Jingoes, Setback for, by H. H. Windsor 27
Jinrikisha Modernized with Pneumatic Tires 378
Joint, Gasket Lock 131
Joint, Rain Proof, for Trees that Grow through Roof of House 546
Joint, Swivel, for Gasoline Station Hose 375
Joints, Auto Universal, Tool for Inserting 133
Joints, Brazed, Making Good 464
Joints, Sunken, in Furniture Panels 616
Jump Testing Machine Registers Height of Jump 281
Jumping, Ski, Championship Exhibition of 357
Jumping Stunt, Spectacular, Ends in Death 904
Junior Association of Commerce, Enterprising, by H. H. Windsor 845

Kafir Corn Harvester Heads Two Rows Simultaneously 490
Kafir Corn, Header for 781
Kangaroo Tries to Throw Athlete 121
Kean, John W.: Hero Honors, Unknown, Electrical Achievements Signalize 19
Kerosene Lamps, Care of 810
Kerosene Mixing Chamber for Auto Engines 607
Kettle, Faucet Attachment for Holding 114
Kettles, Copper, Preventing Wear on 482
Key Attachment Safeguards Locks 429
Key Guide for Door Lock 973
Key, High Speed Wireless, How to Make 814
Keyboard Chart, Practice, on Typesetting Machine 700
Keyboard, Double, on Piano Simplifies Fingering 205
Keyboard Shield Aids Touch Typewriting Students 235
Keyhole Finding in the Dark 284
Keyway Re-Dressing Broach 624
Kiddie Car Teaches Baby to Walk 281
Kiddie Car with Sidecar 280
Kiddie Horse, How to Make 968
Kiddie Scooter, Convertible into Walking Stick 120
Kinney, Frederic: Jet Mine, Utah, Gives Promise of Coming Industry 427
Kitchen, Electrically Operated, on Italian Airship "Napoli" 569
Kitchen Tent, Lightweight, for Tourists 334
Kitchen Utensils:
  Apron, Novel, for Kitchen Use 799
  Ash Pan with Screen Bottom 115
  Beanpot, Glass, for Baking 603
  Bottle and Glass Washer, Electric 36
  Broiler, Dripless, Keeps Stove Clean 439
  Brush for Cleaning Refrigerator Drain Pipe 439
  Can Opener and Bottle Cap Remover in One 931
  Cook Stove, Electric, for Roasting 602
  Cooker, Electric, Has Oven, Hot Plate, and Griddle 767
  Cord Holder, Electric Iron, Clamps to Board 602
  Covers, Jelly Tumbler, Which Open by Pressing Center 439
  Cup, Electric, Heats Liquid Contained Glasses 115
  Dish Drainer for Kitchen Sink 930
  Dish Scraper, Rubber Blade 930
  Dish Washer, Sanitary 931
  Dishcloth Holder for Using in Hot Water 602
  Dishwashing Machine, Portable 94
  Dustpan Held Rigid by Pressing with Foot 438
  Egg Beater, Water Power, Fits Any Faucet 766
  Egg Opener, New Sanitary 266
  Faucet Attachment Is Drinking Fountain, Water Filter and Bottle Washer Combined 115
  Food Container, Air and Water Tight 273
  Food Mixer, Electric 436
  Fork and Spoon Combination Used Like Tongs 766
  Fruit Jar Sealer and Opener 438
  Fruit Jar Wrench, Firm Grip 698
  Griddle, Hollow Base, Distributes Heat Evenly 767
  Heater, Small Electric, Possesses Many Merits 701
  Hot Plate, Electric, for Toasting or Heating 272
  Kettle Holder, Faucet 114
  Knife Sharpener Can be Screwed to Wall 603
  Milk Can Opener, Prepared, Also Closes It 601
  Mixer, Electric, Also Beats Eggs, Breaks Ice, Grinds Coffee, and Freezes Cream 603
  Mop with Small Wringer Attached 766
  Mop Wringer, Bucket 114
  Pan, Aluminum Cake Shell, for Fruit Fillings 114
  Potato Masher and Beater, Slotted Bar 767
  Press, Rotary, for Fruit and Vegetables 931
  Pressure Cooker, Electric 606

Kitchen Utensils: (Continued)
Rolling Pin for Use with One Hand..... 767
Scraper for Dinner Dishes..... 313
Scraper, Shellfish 438
Screen, Wire, for Cooling Bread and Cake 766
Shakers, Salt and Pepper, Open by Pressing Top 438
Shopping Bag Can be Folded to Size of Hand Bag 602
Stewpan, Efficient 156
Table, Collapsible Porcelain, Can be Folded into Small Space..... 115
Table Contains Two Washtubs and Wash Boards 114
Table, Knockdown, for Breakfast or Ironing 439
Tea Holder also Measures..... 603
Teakettle, Electric, Has Two Compartments 746
Teapot Lid Holder also Keeps Spout from Dripping 602
Toaster and Heater Combined, Electric.. 439
Vacuum Cabinet, Sanitary, for Preserving Food 549
Vegetable Slicer Can be Clamped to Table 115
Waffle Baker, Electric, Cleanable..... 602
Kitchenette for Small Modern Apartments 414
Kitchens, Steel, Conserve Space..... 934
Kite, Box, Steeplejack Climbs Chimney with Aid of 214
Kite, Parachute Drop for..... 636
Kite Parachutes, Releaser for..... 962
Kittens are Good-Luck Mascots for Airplane 773
Knife, Curve Cutting, for Scrolls..... 326
Knife, Electrically Heated, for Repairing Batteries 826
Knife for Separating Battery Elements.... 440
Knife, Hunter's Skinning, Prevents Cutting Hides 658
Knife, Pocket, Also Contains Tape Measure 931
Knife, Pocket, Indoor Baseball with..... 146
Knife Sharpener that Screws to Wall..... 603
Knife Switch, Guard Plate for..... 943
Knife Switches Mounted in Safe Position... 616
Knife, Trimming Drawings with..... 953
Knight's Tour Chess Trick..... 648
Knitting Wool, Raveled Out, Straightening 483
Knurl Holder for Lathe Toolholder..... 942
Kolbe, Alexander H.: Phonograph Records, How Made 581
Kudzu, Forage Plant and Soil Builder, by C. E. Pleas..... 909

Labeling Binders for Filing Papers..... 978
Labels, Metal, for Salutations in Letters.. 864
Lace Sewing Machine Saves Much Labor.. 669
Ladder Apparatus, Safety, to Rescue Skaters 506
Ladder Cart, Cultivator, and Truck, Wheelbarrow Convertible into..... 525
Ladder, Fire, for Fighting Roof and Chimney Fires 274
Ladder for Work on Shafting..... 612
Ladder has Auxiliary Legs for Leveling.... 912
Ladders, Fish, on River Dams in Canada.... 355
Ladders, Long, Trusses for Stiffening..... 466
Ladders, Rolling, Improvement for..... 804
Lake, Ancient, in Nevada Disappearing.... 338
Lake Bed, Old, as Storage for Italian Power Project 712
Lake Bottom, Grain Raising on, by Fred S. Walker 395
Lakes, Sardinia Artificial, Among Largest in World 231
Lamp, Antidazzle Auto, Gives Perfect Light 443
Lamp, Auto Parking, Red and White..... 342
Lamp, Auto Tail, Made of Heavy Construction 918
Lamp, Auto Trouble, Mounted on Clothespin 970
Lamp, Counterbalanced Electric, for Hanging Over Chair or Bed..... 438
Lamp Filler, Nonoverflowing..... 797
Lamp, Japanese Table..... 144
Lamp Made of Artillery Shell..... 322
Lamp, Portrait, Aids Home Photography... 675
Lamp Post Crashes through Top of Auto... 547
Lamp Post, Reproduction in Ice by Storm.. 356
Lamp, Self Cleaning Carbide, for Miners.... 116
Lamp, Trouble, Shade for..... 317
Lamps, Artistic, Made from Vases and Drain Tile 486
Lamps, Electric, Safe for Heating Purposes 474
Lamps, Incandescent, Used for Heating Purposes 610
Lamps, Kerosene, Care of..... 810
Land, Abandoned, Reclaimed by Wells, by Horace E. Thomas..... 197
Land, American-Born Japanese May Own.. 736
Land Elevations of Nation shown in Watch Charm 696
Land, Foreign Treaties Allow Foreigner to Hold 356
Land, Irrigated, Hardening of, Makes Cultivation Difficult 432
Land Requirements, Government Scientists to Study 57
Land Seekers Sit Three Weeks in Cold to Register 193
Land Selling, Vast, in Scotland..... 346
Land Settlers, Wisconsin's Novel Method of Attracting 878
Landing Net, Trout, Carried in Pocket..... 182
Landings, Concrete Boat, Making..... 467
Lane, H. A.:
"Dam Is Breaking" Heard Four Miles.... 9
Golf Course, Nine Hole, with Unusual Hazards 67
Motor-Bus Travel Attains World Scope.. 176
Power, High-Tension Direct-Current, from House Currents..... 821
Wireless Waves Guide Air Navigator through Night and Fog.....329
Language—French, Furniture Aids in Teaching 172
Lantern Bases, Cement..... 297
Lard Oil as a Lubricant for Cutting..... 688
Lariat, How to Throw a..... 801
Latex, Rubber, Tensile Strength of Paper Increased by 499
Lath, Metal, Bottle Caps as..... 471
Lathe Arbors, Improved Centers for..... 294
Lathe Attachments, Overhead Drive for.... 628
Lathe, Automatic Engine, for Quantity Production 699
Lathe Chip, Steel, 166 Feet Long..... 282
Lathe Countershaft, Small..... 316
Lathe Dog, Adjustable..... 299
Lathe, Electric Truing Device for..... 224
Lathe, New Type, with Center Drive..... 901
Lathe, Punching in the..... 788
Lathe, Simple Radius Cutting Tool for.... 301
Lathe, Six Inch Bench, Castings for..... 131
Lathe Tailstock Handle, Lever for..... 948
Lathe Toolholder, Knurl Holder Fits..... 942
Lathe, Unwrapping Wire in the..... 790
Lathe Used as Milling Machine..... 784
Lathe, Valve Refacing, High Efficient..... 117
Laundry Appliances:
Bags, Laundry, Eliminate Marking..... 388
Clothesline Fastener Easy to Operate.... 767
Clothespin Bag for Hanging on the Line 767
Cord Holder, Electric Iron, Clamps to Board 602
Ironing Board Can be Clamped to Table.. 115
Laundry Siphon Made from Grease Gun.. 315
Table Contains Two Washtubs and Boards 114
Washer Pump, Electric, for Emptying Water 931
Washing Machine, Electric, Has Electric Light 930
Washing Machine, Trench Helmet..... 149
Wringer, Electric Clothes, with Soft Rubber Roller..... 438
Laundry Association to Have Method Testing Plant 62
Lawn Mower, Apparatus for Sharpening.... 940
Lawn Mower, Chain Driven Noiseless..... 521
Lawn Mower, Fixture for Repairing..... 789
Lawn Mower Grass Carrier Works on New Principle 714
Lawn Mower Handle, Strong, How to Make 974
Lawn Mower, Novel Garden Mulcher Made from 813
Lawn Mower, Sharpening Device for..... 580
Lawn Mowers, Drawn by Small Tractor.. 685
Lawn Sod, How to Lay Properly..... 958
Lawn Sprinkler, Homemade..... 968
Lawn Sprinkling Nozzle Has Fan-Shaped Spray 122
Lawns, Beautiful, Prizes Offered for..... 487

Lawns, Signs Along Parkway Protect..... 598
Laws, State, Overruled by Foreign Treaties 356
Layton, H. G.: Warships, U. S. Navy, Scrapping 835
Lead, Amount of, Used in Telephone Industry 893
Lead and Copper Alloys, Bureau of Mines to Study Preparation of..... 753
Lead Diaphragm Used with X-Ray Apparatus 166
Lead Doll House Furniture, Making..... 809
Lead Roofs, Pure, Not Durable..... 558
Lead, White, for Locking Nuts..... 627
Leather Belt, New Type, Prevents Slipping 880
Leather Fillets for Wood Patterns, Making 132
Leather, Japs Make from Bark of Mitsumata Plant 861
Leather Lagging on Pulleys, Stretching.... 294
Leather, Shoe, Fish and Snake Skins Used as 567
Leather Stains Removed by Solution of Rubber 906
Lectures, College to Give Via Wireless Telephone 887
Leg, Artificial, Permits Natural Knee Motion 184
Leg, Wooden, for Elephant as Added Attraction 868
Legion Post, American, Tribute Paid to.... 46
Lens Hood Made from Drinking Cup..... 960
Lens, Photographic, F-numbers on..... 974
Letter Press, Punch Made from..... 777
Letter, Trick 145
Letters, Metal Labels for Salutations in.... 864
Lettuce, Planting Near Currents..... 645
Levees Protected by Flexible Concrete Paving, by Ivan E. Houk..... 220
Level, Precision, Practical Value of, by C. A. Briggs 207
Lever for Lathe Tailstock Handle..... 948
Lever, Locomotive Throttle, with New Safety Catch 590
Library, Children's, Made of Green Shutters 281
Library, Free Public, "Walking Books" Advertise 847
Library, New, being Constructed at Louvain 820
Library of Congress, Historic Documents Placed in 164
Lid, Secret Box, How to Make..... 962
Lid, Three Section Top, for Grand Pianos... 830
Life Line Gun Fired from the Shoulder..... 1
Life Saving Appliance, Projectile Pistol Is.. 728
Life Saving Belt Adopted by Bootleggers.. 829
Life Saving Medals Awarded to Heroic Navy Men 651
Life Saving Watercycle Folds into Small Space 827
Lifeboat Inventor, Centenary of Death of.. 116
Lifeboat, Motor, of Unusual Characteristics 673
Lifeboat Releasing Gear Is Safety Device.. 271
Lifter, Planer Tool..... 464
Light, Artificial, Tinted Glass for Producing 674
Light, Auto, Informs Driver Which Car Has Right of Way..... 577
Light, Auto Parking, Red and White..... 342
Light, Auto Tail, Made of Heavy Construction 918
Light, Auto Trouble, Mounted on Clothespin 970
Light, Brilliant, Obtained with New Reflector 688
Light Control, Automatic, for Photograph Printing 554
Light, Convenient Bed..... 321
Light, Counterbalanced Electric, for Hanging Over Bed or Chair..... 438
Light Density Control for Movie Film Printer 360
Light, Grinder, and Switch Combined..... 453
Light Post Crashes through Top of Auto.. 547
Light Signal Code, Safety, for Autos..... 593
Light, Special, for Dental and Operating Rooms 112
Lighter, Cigar, Spring Reel, for Autoists.. 80
Lighthouse Floats Five Miles Down a River 843
Lighthouse for Guiding Air Liners, by Everett J. Lovett..... 670
Lighting Effects, Unusual, Produced in Church 823
Lighting Plants, Home, Silencer for..... 158
Lighting Project, Electric, for French Villages 844
Lightning Bolt, Artificial, Realistically Produced 681
Lightning Kills Man and Hurts Wife..... 330
Lights, Beacon, on Mississippi River, by Lewis R. Freeman..... 347
Lights, Electric, on Piano Show Tonal Production 500
Lights, Electric, Safe for Heating Purposes 474
Lignite Can be Converted into High Grade Fuel 568
Limb, Artificial, Donated to Injured Boy by Firemen 608
Limb, Artificial, Permits Natural Knee Motion 184
Limousine Sled for Winter Touring..... 125
Line Gun, Life, Fired from the Shoulder.... 1
Line Throwing Pistol Is Life Saving Appliance 728
Linear Heating Used in Switzerland..... 847
Lineman's Tiny Pile Driver for Driving Pipes 902
Lines, Long Straight, Scribing..... 951
Lining Fixture, Handy Brake..... 131
Links, Flexible Cuff, Allow Cuff to be Pulled Up..... 273
Linoleum, Advertising Stunt Tests..... 739
Linoleum, Keeping Fresh..... 806
Linoleum Makes Sanitary Poultry House Floor 977
Linoleum on Sidewalk as Advertisement.... 266
Lioness, Large, Treated for Ulcerated Tooth 52
Liquid Pouring Attachment, Bottle..... 157
Literature, Radical, Distributed by Russian Government 237
Loader, Bulk Grain, Simple Inexpensive.... 68
Loader, Wagon, Works on Soft Ground.... 92
Lock and Chain to Prevent Accidents..... 296
Lock, Automatic Window, Holds Sash Any Position 249
Lock Cylinders, Door, Easy to Install..... 90
Lock Device for Auto Radiator Cap and Thermometer 193
Lock, Door, Sturdy Burglar-Proof..... 606
Lock, First, Built for Illinois Waterway.... 255
Lock for Automobile Radiator Cap..... 317
Lock for Firm Joint Calipers..... 452
Lock, Handy Portable..... 635
Lock Joint, Gasket..... 131
Lock Mail Box, Combination..... 600
Lock, Micrometer, for Repetition Work.... 619
Lock, Pad, Sweet Potato Grows through... 121
Locker, Tire and Tool, in Rear of Auto Body 194
Locking Device, Garage Door, Holds Any Position 278
Locknut, Simple, How to Make..... 788
Locks, Gun, Repairing..... 971
Locks, Key Attachment Safeguards..... 429
Locomotive, Coal Burning, 20 Inches Long.. 536
Locomotive, Double Drive, with Boiler in Center 820
Locomotive, Electric, Magnet Crane Mounted on 175
Locomotive Explodes with Unusual Violence 907
Locomotive Fuel Problem, French, Coal Dust Briquettes Solve..... 378
Locomotive Pinned to River Bed by Piling, Salvaging 378
Locomotive Pulls 112 Loaded Cars as Demonstration Feat..... 443
Locomotive Smoke Consumer of Canadian Design 605
Locomotive, Strange Type, in Himalaya Mountains 863
Locomotive Terminal Snow, Canadian, Disposed of by Steam Coils..... 191
Locomotive Throttle Lever with New Safety Catch 590
Locomotive Thrown up Side of Hill in Collision 172
Locomotive, Turbine, for Swiss Railway.... 183
Locomotive, Wild, Plunges into Turntable Pit 697
Locomotives, Asbestos Insulating Mats for.. 703
Locomotives, Automatic Fire Door for.... 193
Locomotives, Large American, Chinese Railway Buys 4
Locomotives, Seven, Pull Long Test Train to Ridge of Continental Divide, by Geo. F. Paul 331
Locomotives, Smokiest, Made Smokeless.... 161

Lodge Building, Beautiful, for Fort Wayne 743
Lodge Clubhouse Made of Granite..... 109
Log Cabin, Californian, Artificial Iceless Adorn 545
Log Cabin Corners, Making..... 447
Log Courthouse, Old, in Independence, Mo., Still Used 269
Logging Cables, Simple Fair Leader for Guiding 383
Logging, Huge Floating Derrick for..... 725
Logging in South India with Lots of Men and Animals but Little Machinery..... 526
Logging Industry, Wire Covered Track for Truck in 817
Loom, Automatic Shuttleless, Made in England 732
Loom, Felt Weaving, Is Largest Ever Constructed 728
Lost Tribes Return to Jerusalem, Will the, by Lewis R. Freeman..... 659
Lotton, L. D.: Moth Radiograms, Scientist Investigating 711
Lovett, Everett J.:
Air Liners, Lighthouse for Guiding..... 670
Coal Mining Machine Cuts, Breaks and Loads in One Operation..... 337
Lubricating Device, Air Pressure, for Garages 429
Lumber, How Transported to Kauai..... 729
Lumber Refuse, 700 Foot Suction Pipe Line Conveys 746
Lumber Truck Ratchet Crank Facilitates Unloading 758
Lumber Yard, Large, Electric Cranes Handle Lumber in 228
Lumber, Yellow Poplar, Drying..... 972
Lunch Basket, Refrigerator, for Picnics.... 930
Lunch Booth, Portable, on Ice Skating Rink 499
Luncheon, Social, Served in 60 Foot Boiler.. 246
Lungs and Arterial Blood Studied in the Andes 763

Machine Gun, Centrifugal Force..... 389
Machine Gun, Power Driven, under Development 686
Machine Strap, Adjustable..... 630
Machinery, American, Motion Picture Films to Visualize the Manufacture of..... 864
Machinery Division, New Industrial, in Department of Commerce..... 815
Machinery Parts, Small, Machine Safely Cleans 584
Machinery, Ventilation for, Increases Efficiency 868
Magazine Service Co. a Fraud as Far as Popular Mechanics Magazine Is Concerned 160
Magicians Deserve Protection, by H. H. Windsor 845
Magicians' Secrets to be Respected..... 651
Magnetism, Coal Recovered from Cinders by 718
Magnetism—Force, Attractive Nonmagnetic, Discovered 915
Magnet Crane Mounted on Electric Locomotive 175
Magnet Used for Removing Ball from Check Valve 295
Magnetic Chuck, Holding Nonmagnetic Materials on 947
Magneto and Generator Testing Base..... 950
Magnifying Glass Holder, Artists'..... 465
Mail Box, Combination Lock 600
Mail Box, Concrete Base for..... 647
Mail Box, Glass, Makes Letters Visible..... 718
Mail Carried by Dog Team in Southern California 721
Mail, Recalled, Romance of the, by Grace Orb 883
Mail Service, Improved, by H. H. Windsor.. 188
Mail Terminal, Chicago, Equipped to Handle Big Tonnage 744
Mail Trucks, Armored, for Use in Cities.... 514
Man Lacking Arm and Hands Is Crack Rifle Shot 528
Management Suggestion, Municipal, Prizes for 324
Manganese Mines Developed in Argentina Desert 720
Manger Stock Tie, Automatic..... 468
Manhattan Island, Six Mile Extension Planned for 64
Manhole and Street Drain in Combination Inlet 859
Manifold Heater, Electric, for Cold Engines 266
Manikins, Metal, Germans Introduce..... 657
Manuscript, Historic, Placed in Library of Congress 164
Map, Luminous Star, Aids Amateur Astronomers 101
Map, Moving Road, Operated by Speedometer 523
Map Shows Simple Location System for City Streets 271
Map Shows Wisconsin's Land Settlers..... 878
Map, Weather, Used to Save Money When Placing Ties 696
Maps, Aerial, Check Hydrographic Survey by 733
Maps, Huge Electric Camera for Making.... 343
Maps, Three Dimension Weather, for Airmen 441
Maps, Wall Size, Show City Growth..... 265
Marble or Slate, Drill for..... 793
Marcelling Iron, Electric Hair..... 273
Marine and Naval Air Craft Makes Extensive Flight 218
Marker, Inexpensive Book, Pasted Inside Cover 760
Marker, Practical Book..... 308
Marker, Practical Book, Invented by Blind Man 770
Markers, Street Crossing, White Cement Blocks for 885
Market and Weather Conditions by Wireless Telephone 382
Marking Tool for Bolt Circles..... 450
Marple, Albert: Oil Field, Shallow Well.... 248
Marshall, Lindsay C: Oyster Dredging on the Ice 55
Mascots, Kittens as, for Airplane..... 773
Masher, Potato, Slotted Bar..... 767
Mask, Basket Ball, Protects Eyes..... 597
Massage Vibrator as Negative Agitator During Development 471
Mat, Rubber, Made from Inner Tubes..... 649
Matrices, Stereotype, Made from Type Forms 453
Matter, Atomic Structure of, X-Rays Reveal, by Rogers D. Rusk..... 111
McGarry, Wm. A.: Workers, Industrial Rehabilitation of 33
Measure, Tape, Attachment Makes Measuring Easy 606
Measurements, Electrical Wire, Terms Used in 777
Measuring Tank, Fuel, for Consumption Tests of Engines..... 270
Mechanical Adjustable Creeper for Work Under Autos 520
Medal Awarded Workman for War Invention 487
Medal, Bronze, Commemorates Trip of Japanese Prince 586
Medal, Gold, Commemorates Defenders of Verdun 326
Medals, Life Saving, Awarded to Heroic Navy Men 651
Medicine Cabinet, Chair, Bed, and Bookshelf in One 201
Medicine Dropper, Keeping Handy on the Bottle 960
Medicine Trade, American, Booming in Bombay 340
Meeting, Boosters', Horn Calls to Order.... 242
Memberships, Roosevelt Junior, Offered by Woman's Memorial Association..... 483
Memorandum Pad, Desk, Keeps Paper Clean 935
Memorandum Pad, Telephone, Needs no Pencil 605
Memorial, Booker T. Washington, Unveiling of 847
Memorial, French Army Dog, Parisians Contemplate 736
Memorial, Massasoit, Given Plymouth, Mass., by Redmen 324
Memorial, School Bridge, for War Veterans. 926
Memorial, Service Banner, in Geneseo, Ill.. 668
Memorial to Arctic Explorer Robert E. Peary 824
Memorial Unveiled in Paris to Victims of Bombardment 880
Memorial, War, Dedication of, in Kansas City, Mo. 268
Merchant Marine, German, Enormous Growth of 206
Mercury, Boiling Point of..... 791
Mercury, Thermometer, Replaced by Cheaper Liquid 232
Messages, Amateur Radio, Cross Atlantic Ocean 184
Messages, Wireless, Received on Phonograph Records..... 920

Messages, Wireless Telephone Balloon, Sent Successfully 230
Messengers' Uniforms Cleaned and Pressed by Company 117
Metal—Aluminum, Consistency of, Bureau of Mines Investigating 677
Metal—Calite Has Unusual Properties..... 554
Metal, Cold Tinning of..... 614
Metal—Copper, Oxidized, Process for Recovery of 902
Metal—Copper-Sheathed Ships Menace Iron Ones 917
Metal Cutter Has Horizontal Band Saw.... 31
Metal—Iron, Cast, Cut by Torch in 50 Feet of Water, by A. M. Hoffmann..... 682
Metal—Iron, High Grade, Produced from Magnetic Sand 66
Metal—Iron, Rustproofing 465
Metal, Large Sheet, Bending..... 139
Metal—Lead, Amount of, Used in Telephone Industry 894
Metal—Metallic Calcium, Electrochemical Process for Manufacture of..... 900
Metal Oxidation Prevented by Aluminum Treatment 360
Metal Roofing, Sheet, Cut with Handsaw.... 782
Metal Rose Tree Made with Welding Torch 378
Metal—Steel, Rustless Plastic, Made in England 266
Metal—Tellurium May Raise Gasoline Efficiency 504
Metal, Working Heated 453
Metallic Calcium, Electrochemical Process for Manufacture of..... 900
Metallic Salts, Action of, on Aluminum.... 612
Metals, Polished, Annealed without Tarnishing 716
Meter, Crankcase Oil, Shows Viscosity of Oil 380
Meter, Home Telephone, Counts Calls..... 585
Meter, Illumination, Portable Accurate..... 346
Meter Reading Contest, Power Company Holds 748
Meter, Venturi Gas, Largest Ever Built.... 669
Meter, Wrist, for Locating Electrical Faults of Autos 328
Micrometer, Dial, for Measuring Piston Grooves 276
Micrometer Gives Metric and Inch Readings 76
Micrometer Lock for Repetition Work..... 619
Microphotography, Detection of Forgeries by 754
Mileage and Expense Recorder for Motorists 260
Milk, Adulterated, Apparatus for Testing... 774
Milk Bottle Carrier, Handy..... 796
Milk Can Clamp, Safety, Holds Lid Tight... 116
Milk Can Opener, Prepared, Also Closes It. 600
Milk Cart Made from Buggy Shafts..... 472
Milk, Effervescent, Produced as Carbonated Beverage 760
Milk Germs Counted by Economical Process 240
Milk Transported in Glass Lined Tank Cars and Trucks 6
Milking Machine Washer, Rapid Sanitary.. 730
Milking Machines, Electric, Extensively Used in New Zealand..... 830
Milking Stool, Sanitary Aluminum..... 366
Mill, Century-Old Grinding, Still Grinds Grain 826
Mill File, Sharpening Tools with..... 293
Mill, German Paper Pulp, in Argentina.... 375
Milling Cutters, Gauge for Grinding..... 616
Milling, Face, with Side Mills..... 451
Milling Fixture, Tap and Reamer..... 296
Milling Gauge for Hexagons..... 783
Milling Machine Arbors, Improved Centers for 294
Milling Machine, Lathe Used as..... 784
Milling Machine, Simple Guard for..... 454
Milling Saws, Preventing Breakage of..... 626
Mine Explosion Gas Sampler, Automatic.... 530
Mine Explosion Caused by Telephone..... 570
Mine Fatalities, Coal, for 1921..... 504
Mine, Model Visualizes Inside Workings of. 829
Mine Props, Coal, Tree Planting for..... 418
Mine Rock Bursts, Metal, Experimentally Prevented with Use of Cement Spray Gun 415
Mine Tipple, Coal, Serves Two Mines through Long Conveyor..... 266
Mine, Utah Jet, Gives Promise of Coming Industry 427
Mine, Valuable Diatomite, Operated in Oregon 408
Mine Water, Copper Sulphate, as Timber Preservative 860
Miner, Douglas C.: Radium Clinic, First City, for Rich and Poor..... 592
Mineral, Radium Bearing, Found on British Columbia Islands, by Francis Dickie..... 335
Miners, Self Cleaning Carbide Lamp for.... 116
Mines, Idle, Tell Sad Story, by H. H. Windsor 29
Mines, Manganese, Developed in Argentina Desert 720
Mines, Wet Drills Reduce Dustiness of..... 826
Mining and Refining Arsenic in Virginia, by Phil W. Hanna..... 79
Mining, Copper, Traveling Crusher Station and Assay Office for..... 678
Mining Industry, Census to Show Exact Number of Safety Men in..... 652
Mining Industry Exhibits, U. S., at Brazilian Centennial Exposition..... 508
Mining Machine Cuts, Breaks, and Loads Coal in One Operation, by Everett J. Lovett 337
Mining Occupation Hazardous..... 378
Minnehaha Falls, Beauty to be Restored to.. 282
Miter Scribing Instrument for Irregular Surfaces 860
Mitering Odd Shaped Molding..... 133
Miters Cut Any Angle with Portable Bench Saw 933
Mitsumata Plant, Bark of, Japs Make Leather from 861
Mixer, Electric, Chops Ice, Grinds Coffee, Beats Eggs, and Freezes Cream..... 603
Mixer, Electric Food, for Medium Sized Kitchens 436
Mixing Chamber, Kerosene, for Auto Engines 607
Model for Studying Water Power Problems, by Sam E. Conner..... 275
Model, Herring Weir, Built by Maine Fisherman 403
Model Machinery, Making Bearings for.... 320
Model, Mine, Visualizes Its Inside Workings 829
Model, Rose Garden, for Portland, Oregon.. 109
Modiste, French, Marks Garments to Prevent Counterfeiting 440
Mohammedan Mosque is Only One in Western World 891
Moistener, Envelope, Has Tray for Accessories 765
Moisture, Device Prevents Damage from.... 429
Moisture Eliminators, Demountable..... 929
Mold, Adjustable, Simplifies Pneumatic Tire Repairs 85
Mold for Making Concrete Blocks..... 123
Mold, Revolving, Steel Car Wheels Made in 26
Mold Table, Revolving, on Electric Brass Furnace 386
Molder, Golfing Tee, Makes Tees Different Heights 116
Molding, Odd Shaped, Mitering..... 133
Molecule, Enlarged Model of..... 393
Money—Coin, Swedish, Ten Inches Square.. 402
Money—Coins, Gold, Returned to Circulation 112
Money—Coins, Powder Coated, Aid in Trapping Thief 413
Money Collecting Appliance Shaped like Scoop 900
Money—Dollar Inclosed in Case Teaches Object Lesson 546
Money Orders, Foreign, New Method of Rate Changes for 246
Mono Seaplane being Tested in Rockaway Air Station 105
Monument, Arctic Explorer Robert E. Peary 824
Monument, Booker T. Washington, Unveiling of 847
Monument, Flowered, in Honor of Fallen Canadian Heroes 599
Monument, Service Banner, in Geneseo, Ill. 668
Monument to Commemorate Famous Irish Division 186
Monument, Victims of Bombardment, Unveiled in Paris..... 880
Mop Has Small Wringer Attached..... 766
Mop Truck, Two Tank, for Cleaning Floors 567
Mop Wringer, Bucket..... 114
Mortar Cutting Machine for Brickwork Joints 196
Mosque, Only Mohammedan, in Western World 891
Mosquitoes, Rabbits as a Protection from... 162

Moth, German Preparation Protects Wool Against 514
Moth Preventive, Tissue Paper as..... 798
Moth Radiograms, Scientist Investigate, by L. D. Lotton..... 711
Motion, Intermittent, Correct Design Movement for 452
Motion Picture Actor, Dog Propells Auto for 609
Motion Picture Athlete Defeats Horse in Foot Race 232
Motion Picture Audience Hears Wireless Concert 100
Motion Picture Camera, Home, Direct Positive 824
Motion Picture Film Prepared on Fast Moving Train, by Jack A. Bristol..... 420
Motion Picture Film Printer, Light Density Control for 360
Motion Picture Films to Teach History in Schools 882
Motion Picture Films to Visualize the Manufacture of American Machinery..... 864
Motion Picture Firms, Hermit Sell Sea Life to 91
Motion Picture Patrons, Flashlight for Seating 559
Motion Picture Photography, Sandpaper as Concrete Blocks for..... 408
Motion Picture Projector, Hand Flashlight as 173
Motion Picture Scene, Soap Bubbles for..... 339
Motion Picture Scene, Wrecked Ship Hulk Imitated with Torch..... 380
Motion Picture Studio, Large Glass, Delicate Operation of Moving..... 561
Motion Picture Theater Constructed in Three Sections 565
Motion Pictures and Taffy Making on Touring Truck 425
Motion Pictures, Audible, Phonograph to Make 870
Motion Pictures in Farmer's Home Acts as Tractor Salesman 493
Motion Pictures of Petroleum Industry as Safety Campaign 889
Motion Pictures of Shell Bursts Photographed with Long Range Camera..... 591
Motion Pictures, Philadelphia City Council Shown 673
Motion Pictures Show Italian Art Treasures 584
Motion Pictures, Slow, Camera Attachments for 363
Motion Pictures, Talking, Made with Aid of Radio 859
Motion Pictures to Illustrate Einstein Theory 892
Motor, Best Airplane, Prize Offered for..... 159
Motor Bus, New Chicago, Nearly Equals Street Car 680
Motor Bus, Pacific Coast, Seats Forty..... 375
Motor Bus, Windshields on Upper Deck of.. 720
Motor Bus, 20 Passenger, Specially Designed 657
Motor Busses for Highway Transportation, by A. H. Lane..... 176
Motor Busses on Rails Replace Street Cars. 855
Motor Busses, Tilting Tests Show Safety of. 392
Motor, Generator, and Transformer Testing, Part I—Motors 289
Motor, Generator, and Transformer Testing, Part II—Generators and Transformers.... 456
Motor Generators, Driving Unit for Banding 455
Motor Hotels, by H. H. Windsor..... 29
Motor, Keying Small Pulley to..... 616
Motor, Phonograph, Simple Electric..... 40
Motor Sled Has Wheels for Climbing Hills.. 415
Motor, Small Electric, Fits Any Phonograph 765
Motor, Small, Mounted on Battery..... 974
Motor, Straight Eight, English Auto Has.... 56
Motor Truck, Elevating End Gate Attached to 877
Motor Truck, Two Story Office Building Moved by 717
Motorboat and Auto in One..... 183
Motorboat Drawn Over Snow by Tractor.... 697
Motorboat, Small, Reversing Device for..... 579
Motorcycle Bobsled, How to Make..... 474
Motorcycle for Cheap, Clean, and Comfortable Riding 252
Motorcycle, German, Antiskid Wheels on.... 2
Motorcycle Improvised as Delivery Truck.. 957
Motorcycle Sidecar, Streamlined Windscreen for 276
Motorcycle, Special Racing, Built to Break World's Record 403
Motorcycle, Steam, is Economical to Operate 204
Motorcycle Transformed into Auto Bobsled.. 41
Motorcycle, Using for Power..... 807
Motorcycle, Welding Outfit on..... 39
Motorists, Desert Roadway Fenced to Guide 666
Motorship, Largest All-American-Made Twin Screw 173
Moulton, Robert H.: Package Machine Ties and Seals at One Time..... 532
Mount Everest, Expedition Aims to Scale... 30
Mount, Harry A.: "Gassing" Bad Odors..... 219
Mount Rainier, Climbing in Midwinter, by Lawrence Wm. Pedrose..... 713
Mountain—Cañon Walls Serve As Poles for Transmission Wires 820
Mountain Climbing Locomotive, Strange Type 863
Mountain Climbing Made Safer with New Wireless Apparatus 818
Mountain — Continental Divide, Proposed Tunnel through, by Geo. F. Paul..... 331
Mountain Highway, Ancient, becomes Modern Railway 879
Mountain in Pacific Ocean Is Huge Mass of Sulphur 184
Mountain—Mount Everest, Expedition Aims to Scale 30
Mountain—Mount Rainier, Climbing in Midwinter, by Lawrence Wm. Pedrose..... 713
Mountain Moving in Rio De Janeiro to Afford More Air and Building Space..... 516
Mountain Tunnel, Road and Stream Share... 99
Mountains of Burma, Expedition to Investigate 827
Mousetrap Connected to Auto Horn Prevents Theft 473
Mousetrap Set without Bait..... 977
Movement, Correct Design, for Intermittent Motion 452
Mower Handle, Strong, How to Make..... 974
Mower, Lawn, Apparatus for Sharpening.... 940
Mower, Lawn, Chain Driven Noiseless..... 521
Mower, Lawn, Sharpening Device for..... 580
Mower Wheels, Soil Crusher Made from..... 486
Mudhooks, Automobile, Made from Hinges.. 969
Muff for Autoist's Hands..... 158
Muffler, Engine Testing at the..... 949
Muffler for Home Lighting Plants..... 158
Mulcher, Novel Garden, How to Make..... 813
Mulching Paper Prevents Weed Growth..... 830
Multiplane of French Design..... 384
Municipal Management Suggestions, Prizes for 324
Muscle Shoals and Nitrate Plant, Airplane View of 327
Music Memory Contest in Schools..... 816
Music Produced from Boulders..... 110
Musical Instruments:
Banjo Attachment Throws Sound Forward 162
Banjo, Muting a..... 319
Banjo Resonator Amplifies Its Volume Snappily 932
Cornet Player Attachment Eliminates Fingering 338
Piano, Double Keyboard, Simplifies Fingering 205
Pianos, Grand, Three Section Top Lid for. 830
Ukulele Peg, Metal, Fits all Types..... 436
Violin Family, Six New Instruments Added to 492
Violin Made of Matches, Toothpicks, and Glue 695
Violin, Muting a..... 479
Violin of Different Woods for High and Low Tones 340
Violin Player, Group Control..... 260
Violin Playing with Artificial Arm..... 241
Violins, Tone Producer for..... 328
Musical Program, Phonograph, Heard by Wireless 2,800 Miles 865
Musical Service, Highly Efficient, Regarded as Civic Achievement..... 979
Mussels on Ship Bottom Capture Small Fish. 728
Mute for Banjo..... 319
Muting a Violin..... 479
Myrtle Wood Grown for Commercial Purposes 426

Nails and Screws Made to Drive Easily.... 465
Nails as Campfire Irons..... 800
Nails, Preventing from Splitting Thin Wood 956

Name, Lucky, Horoscope Prize for..... 651
Name, Reckless Auto Driver, Prize for..... 980
Name, Woodworking Machine, Prize for... 815
Naval and Marine Air Craft Makes Extensive Flights 218
Naval Holiday, Jingoes and the, by H. H. Windsor 519
Navy Men, Heroic, Life Saving Medals Awarded 651
Necktie Press 273
Needle Case Holds Different Size Needles.. 272
Needlework, Prizes Offered for..... 159
Negatives Agitated During Development... 471
Negatives, Clearing Stained..... 807
Negatives, Old, Film Stripping from..... 786
Neon Utilized as Spark Plub Tester..... 118
Nest, Automatic, Laying Hens are Trapped in 30
Nest, Poultry, Made from Trench Helmet... 147
Net, Landing, for Catching Poultry..... 635
Net, Shark Proof, Protects Long Distance Swimmer 717
Net, Trout Landing, Carried in Pocket..... 182
Newspaper, Auto Ignition System Kept Dry with 641
Newspaper Offers Horoscope Prize for Lucky Name 651
Newspaper Questions, Prizes Offered for Answers to 159
Nightcaps, Electric, for Warming Cold Heads 41
Nitrate Plant and Muscle Shoals, Airplane View of 327
Nitrates Produced Chemically..... 346
"No Man's Land" at Rheims Contains 600 Houses 935
Nonmagnetic Force, Attractive, Discovered. 915
Nonmagnetic Materials Held on Magnetic Chuck 947
North Pole Flight, Amundsen to Attempt, by Lawrence W. Pedrose..... 875
Nose, Artificial, in Horse's Neck..... 935
Nose Print, Blooded Cattle Identified by.... 915
Notebook, Loose Leaf, Pocket for..... 126
Notebooks, Making Blueprints for..... 631
Nozzle, Lawn Sprinkling, Has Fan-Shaped Spray 122
Number, House, on Curb to Guide Motorists 906
Nut Shelling Machine, Piñon..... 606
Nuts, Cylinder Base, Wrench for..... 297
Nuts, Rounded Edge, Tightening..... 953
Nuts, Tight Wire Wheel, Removing..... 314
Nuts, White Lead for Locking..... 627

Oat Sprouter, Incubator Used as..... 146
Ocean Depth, Echo Employed on Ships for Measuring 689
Odors, Gassing Bad, by Harry A. Mount..... 219
Office Appliances:
Chair Device Easily Adjusts Its Height.. 251
Chart, Simple Rapid, for Figuring Pay Rolls 246
Copy Holding Board, Simple..... 600
Desk, Collapsible, Fits in Safe..... 101
Desk Memo Pad Keeps Paper Clean..... 935
Desk Tray, Adjustable..... 42
Desk Tray, New, is Wind-Proof and Convenient 242
Dictaphone Reproducer, Loud-Speaking, for Records 871
Envelope Moistener Has Tray for Accessories 765
Pencil Grip, Rubber, Prevents Slipping... 890
Printing Outfit for Office Stationery..... 424
Seal Hand Press Made into Foot Press... 871
Sealing Machine, Electric..... 418
Sealing Wax Applier, Electric..... 100
Tax Computing Machine Has Chart for Any Tax Rate..... 863
Office Building, Giant, to be Built Around Old Dwarf Building..... 390
Office Building Has Basement Garage for Tenants 921
Office Building, Two Story, Moved by Motor Truck 717
Office, Portable Express, for Fairs and Exhibits 75
Office Theater Building Has Three First Floors 107
Oil and Gas Royalties on Government Owned Land for 1921..... 726
Oil Burner, Heavy, for Small Heating Plants 251
Oil Burning Coal Stove..... 151
Oil, Compressed Air Increases Production of 607
Oil Development Predicted for South America 932
Oil Dispenser is Quick and Accurate..... 119
Oil Field Boiler Burners, Efficiency Test for 551
Oil Field, Shallow Well, by Albert Marple.. 248
Oil Field, Texas, Concrete Derrick Bases in 82
Oil, Fuel, Government Saves on Naval Vessels 764
Oil Gusher Damages Residential Part of City 887
Oil Hardening by New Substance as Catalyst 656
Oil in Australia, Awards for Discovery of.. 488
Oil in Florida, by H. H. Windsor..... 187
Oil Industry, Motion Pictures of, as Safety Campaign 889
Oil, Lard, as a Lubricant for Cutting..... 688
Oil Measuring Tank for Consumption Tests of Engines 270
Oil Meter, Auto Crankcase, Shows Viscosity of Oil 380
Oil Pipe Line Proposed for Argentina..... 770
Oil Pipe Lines, Elephants Destroy, in Island of Sumatra 567
Oil Production Lessened by Delay in Drilling 890
Oil Refinery Still, Explosion of..... 252
Oil Resources, Alaskan, being Investigated. 582
Oil Shale, Bricks Made from..... 330
Oil Shale, Distillation of at Low Temperature 496
Oil Shales, University Has Complete Equipment for Analysis of..... 915
Oil Tank Cars, Unloading Rack Quickly Empties 44
Oil Tanker, Single Deck Ship Converted into 56
Oil Testing Instrument for Auto Engines... 365
Oil Well, Diamond Core Drill for Drilling... 521
Oil Well Proves to be "Gasser" Instead of "Gusher" 8
Oil Wells, Obstructed, Machine for Cleaning 925
Oilcan, Increasing Reach of..... 947
Oilcan Lamp Filler, Nonoverflowing..... 797
Oilcans, Finger Clips for..... 157
Oiled Paper for Apples Stop Scald..... 738
Oiler, Wick Feed, Made from Grease Cup... 459
Oils, Floor, Test Darkening Effects of..... 830
Oilstone, Preventing from Slipping on Bench 951
Oilstove Wicks, Flannel as Emergency..... 479
Opera, Actual Grand, Phonograph Records Made of 42
Operating Rooms, Special Light for..... 112
Operation Completed by Doctor with Use of Flashlights 923
Opiate, Harmless, Prize Awarded Discoverer of 41
Orange Grove, Propellers Circulate Air to Heat 902
Orb, Grace: Mail, Recalled, Romance of the 883
Organic Cells Reproduced from Inorganic Substances 367
Organic Chemical Association, New..... 323
Organisms, Harmless, Makes Water Distasteful 410
Ornamental Ironwork, Cutting Torch Produces 787
Ornamental Table Top Made of Steel Tubing 715
Oscillation Transformer, Radio..... 150
Outing Backrest, Comfortable..... 565
Ovals, Drafting Instrument for Drawing... 113
Ox, Gigantic, Exhibited in Australia..... 84
Oxen Draw Girls and Dogs at Bench Show.. 927
Oxidation, Metal, Prevented by Aluminum Treatment 360
Oxyacetylene Welding Equipment, Portable 192
Oxygen Removed from Water to Prevent Pipe Rusting 744
Oxyscope Records Effects of Air in Furnace Gases 73
Oyster Dredging on the Ice, by Lindsay C. Marshall 55

Package Campaign, Perfect, Results Announced 604
Package Machine Ties and Seals at One Time, by Robert H. Moulton..... 532
Packets, First Aid, Carried Visibly on Pullman Cars 506
Pad, Desk Memo, Keeps Paper Clean..... 935
Pad, Earache, Electrically Heated..... 272
Pad, Telephone Memo, Needs no Pencil..... 605
Padlock Device, Door Opened from Either Side with 959
Padlock Hasp, Preventing from Breaking.. 953

Padlock, Sweet Potato Grows through..... 121
Pail, Auto Washing, Saves Soap and Varnish 765
Pail, Motorists' Water, Inner Tube as..... 144
Pail, Radiator Filling, Improved..... 637
Pails, Paint, Handy Convenience When Opening 961
Paint—Amber and Olive-Drab Color, How to Make 978
Paint Brushes, Box for Preserving..... 549
Paint, Fire Engine Red, Prohibited on Chicago Private Autos..... 238
Paint Pails, Handy Convenience When Opening 961
Paint Pigment, New, Said to be Nonpoisonous 905
Paint Removing Machine Saves Time and Labor 100
Painting, Auto, Dust Preventing Hints for. 314
Painting Old Walls, Hints on..... 785
Painting Scaffold, Clever, for Interior Work on Large Dome..... 869
Palestine, Water Power Development to Restore, by Lewis R. Freeman..... 849
Pan, Aluminum Cake Shell, for Fruit Fillings 114
Pan, Ash, Has Screen Bottom..... 115
Pan, Efficient Stew..... 156
Pan, Food, Water and Air Tight..... 273
Panama Canal Revenue for One Day..... 362
Paper Bags for Protecting Early Plants.... 637
Paper, Blotting, Glued to Bric-a-Brac Prevents Scratches 812
Paper, Carbon, as Typewriter Ribbon Substitute 157
Paper, Drawing, Reel for..... 125
Paper Fly Trap, Sanitary, Is Made Ornamental 862
Paper, Improvised Developing Tray Made from 977
Paper Made from Louisiana Rice Straw.... 544
Paper Making Material, Rubber as, by New Process 227
Paper Mill, Miniature..... 47
Paper, Mulching, Prevents Weed Growth.... 830
Paper Pulp Mill, German, in Argentina..... 375
Paper, Roofing, Fastening under Eaves..... 643
Paper, Sail Boat Model Made of..... 279
Paper, Sensitized, Displaces Roll Film..... 553
Paper Shipping Tubes for Rugs..... 905
Paper Strength Visualized by Novel Demonstration 658
Paper, Tensile Strength of, Increased by Rubber Latex 499
Paper, Tissue, as Moth Preventive..... 798
Paper Weight Also Contains Writing Desk Sets 439
Paper, Wrapping, Made Water, Dust, and Vermin-Proof 118
Paper, Wrapping, Wattle Wood and Bark to be Made into..... 842
Papering Machine for Walls Holds Paste and Paper 680
Papers, Historic, Placed in Library of Congress 164
Parachute Drop for Kite..... 636
Parachute, Two Part, Reduces Shocks..... 351
Parachutes, Kite, Releaser for..... 962
Parade, Safety First Accident, in Syracuse, New York 392
Paraffin Wax Prolongs Life of Emery Belts. 946
Parallel Blocks, Adjustable..... 299
Paris Hustling to Improve Its Appearance.. 89
Park Cafeteria Popular with Tourists..... 261
Park, Old Abandoned Cemetery Made into.. 927
Park System, Wonderful, Westchester County Plans 596
Parking Lamp, Auto, Red and White..... 342
Parking Restriction Signs in San Francisco, Calif. 268
Parks, State, Second National Conference in Interest of 979
Pattern Construction, Unusual..... 300
Patterns, Wood, Making Leather Fillets for 132
Patterns, Wooden, Finishing..... 792
Paul, George F.: Locomotives, Seven, Pull Long Test Train to Ridge of Continental Divide 331
Pavement Digging Tool, Asphalt, on Work-Car 96
Paving Brick, Serves Well During Long Period 750
Paving, Flexible Concrete, Protects Levees, by Ivan E. Houk..... 220
Paving, Road, Average Cost of..... 674
Pay Rolls, Simple Rapid Chart for Figuring 246
Peace Plan, Japanese Women's, 300 Feet Long 2
Peanut Butter, Well Mixed, Machine Dispenses 442
Peat, Powdered, as Fuel for Heating Furnaces 92
Pecan Tree Culture to be Tried in China... 896
Pedestrians, Country Road, Safety-First Cards Teach 122
Pedrose, Lawrence Wm.:
Coal, Alaskan, Assumes Commercial Importance 562
Cranberry Bogs, Artificial, in the Northwest 409
Hospital, Farthest North, Building the... 49
Mount Rainier, Climbing in Midwinter.... 713
North Pole Flight, Amundsen to Attempt. 875
Smugglers Use Clever Dumping Device... 391
Whale-Hunting on the Top of the World. 167
Peeling Machine, Fruit, Uses Caustic Soda Vapor 726
Peg, Improved Tent..... 970
Peg, Metal Ukulele, Fits All Types..... 436
Pen Check Protector Prevents Forgery..... 356
Pen, Child's Play, How to Make..... 811
Pen, Portable, for Little Chicks..... 959
Pen Reservoir Avoids Redipping..... 437
Pen, Scorching, Prevents Forgery..... 231
Pencil and Pen Case for School Children... 609
Pencil Grip, Rubber, Prevents Slipping..... 890
Pencil, Scorching, Prevents Forgery..... 231
Pencils, Drawing, Sharpening..... 458
Penknife, Indoor Baseball with..... 146
Pens, Fountain, Electrically Heated Type Engraves 506
Pepper and Salt Shakers Open by Pressure on Top 438
Peppermint Root Planting Machines, Automatic 433
"Perfect Package Month," Results Announced 604
Perforating Machine for Railroad Ties..... 51
Perfume, Deadly War Gas Made into..... 87
Personal Heating Is Theory of Englishman. 726
Petroleum Industry, Motion Pictures of, as Safety Campaign 889
Petroleum Oil in Australia, Awards for Discovery of 488
Phonograph, Eight Games Played on..... 367
Phonograph Mechanism Tells Water Height. 54
Phonograph Motor, Simple Electric..... 40
Phonograph Motor, Small Electric, Fits Any Instrument 765
Phonograph Musical Program Heard by Wireless 2,800 Miles..... 865
Phonograph Record Filing Envelopes, Hang Up 768
Phonograph Record Lifting Disk..... 38
Phonograph Records, How Made, by Alexander H. Kolbe..... 581
Phonograph Records Made of Actual Grand Opera 42
Phonograph Records, Radiotelegraph Code Taught with..... 590
Phonograph Records, Wireless Messages Received on..... 920
Phonograph, Special, Sends Concerts by Radio 848
Phonograph to Make Motion Pictures Audible 870
Phonograph Tone Amplifier Has Auxiliary Sound Box..... 553
Phonograph Tone, Increasing..... 313
Phonograph Tone, Softening..... 315
Phonograph, Wireless Telephone Constructed in Form of..... 753
Phonographic Sound Box, Perforated Disk.. 918
Phosgene (Deadly Gas) Made into Perfume. 87
Phosphor Copper, Bureau of Mines to Study Preparation of..... 763
Photograph, Distorted Reflection, Snapped from Boat..... 744
Photograph of Building Perfectly Portrayed in Water..... 372
Photograph Printer Has Several New Features 548
Photograph Printing, Automatic Light Control for..... 554
Photograph—View, Airplane, of Muscle Shoals and Nitrate Plant..... 327
Photographs, Aerial, Check Hydrographic Survey by..... 733
Photographs, Sculpture Carving from..... 294
Photographs, X-Ray, Magnified with New Dental Appliance 38

Photography:
Blueprint Washer, Improved 460
Camera, Jewelers', Produces Exact Size Pictures 894
Camera, Tiny French Plate, Built like Pistol 750
Chemical Crusher Made from Spoon 470
Developing Holder for Cut Films 468
Developing Tray, Improvised 977
Film, Paper-Backed Photographic, Introduced in Germany 193
Film Stripping from Old Negatives 786
Lamp, Home Portrait 675
Lens Hood Made from Drinking Cup 960
Lens, Photographic, F-Numbers on 974
Negatives Agitated During Development 471
Negatives, Clearing Stained 807
Paper, Sensitized, Displaces Roll Film 553
Photograph Printer Has Several New Features 548
Photographing Wild Birds and Animals 632
Print Drying Stretcher 145
Printing, Photograph, Automatic Light Control for 554
Prints, Glossy Photographic, How to Make 805
Prints Judged for Good Sepia Tones 961
Prints, Preventing Discoloration of 796
Reflections, Distorted, Snapped from Boat 744
Reflector, Cheap, for Home Use 812
Silver Recovered from Fixing Bath by New Process 230
Snowflakes, Photographing 309
Transferring Prints to Glass 155
Piano, Double Keyboard, Simplifies Fingering 205
Piano, Electric Lights on, Show Tonal Production 509
Piano Recital by Wireless 3
Piano Rolls, Player, Repairing 969
Pianos, Grand, Three Section Top Lid for 830
Picnics, Refrigerator Basket for 930
Picture of Building Perfectly Portrayed in Water 372
Picture Stories for Children 120, 280, 444, 608, 772, 936
Picture—View, Airplane, of Muscle Shoals and Nitrate Plant 327
Picture, Wooden, Painted with Natural Colored Wood 381
Pictures, Framed, Hanging 961
Pictures, Made to Hang Straight 151
Pictures, Sculpture Carving from 204
Pictures, Talking, Made with Aid of Radio 859
Pictures, Transferring Printed 308
Pier, Amusement, Wrecked by Runaway Barge 555
Pier, Vancouver, Canadian Pacific Railroad to Resume Work on 699
Piers, Foundation, Epoch Making Tests of, by Henry S. White 23
Piers, Union Station Foundation, Testing, by Henry S. White 653
Pig Raising Club Aids Indiana Farmers 652
Pigeons Carry Messages from Fishing Boats to Cannery 387
Pigment, New Paint, Said to be Nonpoisonous 905
Pile Driver, Lineman's Tiny, Drives Pipes at Pole Base 902
Pile Driving with Swinging Lead to Prevent Breaking 406
Piles, Concrete, without Forms 286
Piles, Round Concrete, with Great Taper 600
Piling Driven Upward by Inverted Steam Hammer 560
Pill Box, Magic 315
Pillow, Vanity, Contains "Make Up" Necessities 931
Pills and Corks, Doctor's Sign Made of 122
Pilot, Automatic, Goliath Airplane Controlled with 857
Pin, Rolling, for Use with One Hand 767
Pin, Sewing, for Hemming 272
Pin, Soft Shearing, Used in Quick Change Chuck 274
Pinch Dogs, Belt Fasteners as 293
Pine Tree, Historic, 1,200 Years Old 914
Pineapples, Mulching Paper for, Prevents Weed Growth 830
Piñon Nut Shelling Machine 606
Pins, Locking Cotter 617
Pins, Long Slender, Tool for Driving 448
Pins, Polishing Ends of 461
Pioneering Made Easy by Tractor and Auto 715
Pipe Aid, Water, in Battery Service Station 139
Pipe Bowl, Two Piece, Spiral Smoke Course in 929
Pipe, Cast Iron, Cut by Torch in 50 Feet of Water, by A. M. Hoffmann 682
Pipe Coils, Care of, in Hot Air Furnaces 321
Pipe Coils Relieve Tension Caused by Expansion 771
Pipe Corrosion, Studies Made of 46
Pipe Cutter, Improving the 783
Pipe Driver, Tiny, Drives Pipes at Pole Base 902
Pipe Driving, Underground 788
Pipe Freezing to Remove Faucet 636
Pipe Line, Oil, Proposed for Argentina 770
Pipe Line, 700 Foot Suction, Conveys Lumber Refuse 746
Pipe Rusting, Oxygen Removed from Water to Prevent 744
Pipe Sleigh Runners for Baby Carriage 313
Pipe Smoker, Automatic, for Testing Tobacco 432
Pipe, Steel, Ornamental Table Top Made of 715
Pipe Strainer, Smoker's, Made of Steel Wool 402
Pipe, Thin, Tapping Holes in 782
Pipe—Tubing, Frame for Building Made of 422
Pipe, Well, Driving 149
Pipes, Drain, Forcing Obstructions from 471
Piping, Wood Stave, Is Fire Resisting 70
Pistol, Fire Extinguishing, Also Repels Burglars 237
Pistol, Projectile, Is Life Saving Appliance 728
Pistol Range, Miniature, Vending Machine Has 923
Pistol, 16 Shot, Made in Belgium 261
Pistol, 20 Gauge Shot, by Capt. Edward C. Crossman 405
Piston and Crankshaft Universal Alinement Jig 77
Piston Grooves, Dial Micrometer for Measuring 276
Piston, Improved Design, Saves Oil and Gasoline 770
Piston Rings, Odd Sized, Grinding 791
Pistons, Iron, Made Light by Skilful Design 680
Pistons, Wrist Pin Bushing Jack Prevents Distortion of 951
Pit, Drain, Filling Station 302
Plan for City Beautiful 601
Plane Handle Made Adjustable 142
Plane, Toy Water, How to Make 808
Planer Tool Lifter 461
Planer Vises, Adjustable 462
Planes, Carpenters', Extension Attachment for 561
Planet—Saturn's Rings Will be Dispersed by Its Satellites 488
Planet Venus, Atmosphere of, Contains No Oxygen 714
Plank, Shod, for Pulling Autos Out of Mud or Sand 647
Planking, Sectional, Road Built on Sandy Shore Uses 589
Plant Growth, Vitamines Unnecessary for 44
Plant Safety Inspectors, Employes Contest to Boost 274
Planter, Potato, Made from Old Corn Planter 956
Planting Machine, Peppermint Root, Automatic 433
Planting Tool, How to Make 971
Plants, Early, Paper Bags for Protecting 637
Plants, Transplanting Tool for 808
Plants:
Artichoke as Possible Source of Sugar 202
Ferns Grown in Florida for Northern Markets 186
Kudzu as Soil Builder, by C. E. Pleas 909
Maguey, Alcohol as By-Product of 934
Mitsumata, Bark of, Japs Make Leather from 861
Seaweed Collected by Tide Barriers 90
Spinach Pickers Use Boats on Large Chinese Marshes 678
Plaster, Court, Flexible Liquid 486
Plat Shows Simple Location System for City Streets 271
Plate Case, Numerically Holding 130
Plate, Electric Hot, for Toasting and Heating 272
Plate Printing Press Prints from Copper or Steel Plates 342
Plate Scraper, Dinner 313
Plates, Electrolytic Reflector, "Forming" 646
Plates, Home Port, for Autos Popular 62

Plates, Working Heated 453
Platform, Three Wheeled, for Gathering Figs 386
Platinum, Substitutes for, Prove Satisfactory 724
Play Pen, Childs, How to Make 811
Player Piano Rolls, Repairing 969
Playgrounds, Foundation to Help Town Establish 815
Plays, Local and Present Day Life, Theater Society Offers Prizes for 979
Pleas, C. E.: Kudzu, Forage Plant and Soil Builder 909
Pleuromanas, Capturing the, by Leon Augustus Hausman 69
Plier, Self Locking 117
Pliers for Holding Carriage Bolts 947
Plow and Weed Killer Attachment for Tractors 417
Plow or Planer, Portable Machine May be, by Henry S. White 530
Plow, Tractor Drawn Brush, for Land Clearing 864
Plow Wheel, Dust Shield for 638
Plowshares, Cleaning 312
Plug, Fusible, Stops Overheated Air Compressor 868
Plumbing:
  Ball Valve, Automatic, of Extreme Simplicity 881
  Pipe Freezing to Remove Faucet 636
  Soldering Copper, Universal 617
  Valve, Safety Relief, of Improved Design 442
  Well Pipes, Driving 149
  Well Strainers, Porous Concrete Casings as 226
Plymouth, Village of, School Pupils Model 936, 937
Pneumatic Clay Digging Tool 257
Pocket for Loose Leaf Notebook 126
Pocket Knife Also Contains Tape Measure .. 931
Poem, Best College Undergraduate, Prize Offered for 980
Poem, Spirit of Transportation, Prize Offered for 799
Pogo Sticks, Tennis Playing on 332
Poison, Endless Chain of, Kill Rats in Europe 82
Poison Gas, Deadly War, Made into Perfume 87
Poisoning, Carbon Monoxide, First Aid Treatment for 552
Pole Climbing Irons, Improvised 961
Pole, Notched, for Holding Infant Clothes Hangers 114
Poles, Detroit Trolley, Painted Aluminum at Stop Corners 927
Poles, Telephone, House Built of 542
Poles, Telephone, Total Length of 110
Poles, Totem, Indian "Copyright Law" Concerning, by Francis Dickie 898
Police Department:
  Automobiles, Police, Identified by Special Marks 536
  Crime Mysteries, Hair Structure to Solve, by John Anson Ford 571
  Radiophones to Aid Police 489
  Shackle Boot to Prevent Escape of Criminals 525
  Tear Gas Used as Emergency Measure by Police 515
Policemen, Egyptian, Carry Shields for Protection 693
Polish, Shoe, Prizes Offered for Best List of Uses for 651
Polishing Wheels, Balancing 787
Political Candidates Do Electioneering by Wireless 72
Pontoon Bridge, Hulls of Wooden Ships for. 565
Pontoons, Wrecked Ships Salvaged with 341
Popgun, Water 469
Poplar Lumber, Yellow, Drying 972
Poppies as Cut Flowers 806
Poppies, Growing Oriental 960
Porcelain, Hole Drilling in 613
Porch Swing and Hammock, Adjustable Position 767
Port, Improved Air, for Ships Have No Tumble Bolts 437
Portholes, Ships' Circular, Frameless Windows Replace 700
Portrait Lamp Aids Home Photography 675
Post, Fence, Facilitating Removal of 799
Post Office Department:
  Foreign Bureau Established in Minneapolis Post Office 276
  Mail, Recalled, Romance of the, by Grace Orb 883
  Postmasters Ordered to Aid in Search for Missing Friends and Relatives 160
Posters, Kindness to Animals, Prizes for 651, 815
Posts, Buried, Preventing Decay of 637
Posts, Fence, Preserved by Trench Helmets 147
Pot, Glue, Deodorizing 136
Potash Discovered When Drilling for Oil ... 735
Potato Masher and Beater, Slotted Bar 767
Potato Plant Sprayer, How to Make 795
Potato Planter Made from Old Corn Planter 956
Potato, Sweet, Grows through Padlock 121
Potatoes, Box Car Booth in Wisconsin Exhibit Made of 926
Poultry — Hens, Laying, are Trapped in Automatic Nest 30
Poultry House Floor, Sanitary, Linoleum Makes 977
Poultry, Landing Net for Catching 635
Poultry Nest Made from Trench Helmet 147
Poultry Pen, Portable, for Little Chicks 959
Poultry, Vaccination of, Against Chicken Pox 338
Powder, Talcum, Makes Playing Cards Slick 157
Power, Electric, Low Grade Coal to Produce 830
Power Expansion, Water, in Ohio River Basin 336
Power Hammer for Farm Shops 611
Power Plant Development in Arkansas, by Tom Shiras 574
Power Plant, Electric, on Skagit River Projected 342
Power Plant, Farm Tractors Drive, Made Powerless by Drought 584
Power Plant, Gigantic Turbine, Designed for Germany 884
Power Plant, Huge Canadian, Completed at Niagara 326
Power Plant, Isolated, Community Center at, by Charles W. Geiger 888
Power Plant, Submarine, to Give 10,000 Mile Radius 102
Power Plant, Vermont, First Step in Development of 536
Power Press, Automatic, Prints from Copper or Steel Plates 342
Power Project, Italian, Old Lake Bed as Storage for 712
Power Resources, Records of, Kept by War Department 198
Power Shovel, Novel, Gasoline Engine Drives 832
Power Stations, Chicago's, Enormous Capacity of 394
Prams for Children in Zoological Gardens .. 444
Perambulator Sleigh Runners Made of Gas Pipe 313
Preservative, Timber, Copper Sulphate Water Is 860
Preservative—Waterproofing Material, Concrete, Tower Tests 913
Press, Arbor, Made from Old Vice 465
Press, Automatic Power, Prints from Copper or Steel Plates 342
Press, Foot, Seal Hand Press Made into 871
Press for Straightening Bent Auto Fenders. 461
Press, Large Capacity Arbor, How to Make 775
Press, Necktie 273
Press, Rotary, for Fruit and Vegetables 931
Presses, Punch, Safety Device for 137
Pressure Cooker, Electric 606
Pressure, Soil, Measured Accurately by Machine 577
Price Marks, Safeguarding on Stock Drawers 614
Price Tag Holders, Simple, How to Make 805
Prince, Chinese, Afraid to Ride in Auto 78
Print Drying Stretcher 145
Printers' Chase Simplifies Locking Up Forms 688
Printing Machine, Photograph, Has Several New Features 548
Printing, Multicolored 623
Printing Outfit Uses Type Strung on Wires 424
Printing, Photograph, Automatic Light Control for 554
Printing Press Attachment for Distributing Ink 718
Printing Press, Power, Prints from Copper or Steel Plates 342
Printing Presses, Safety Attachments for ... 455

Printing—Stereotype Matrices Made From Type Forms ... 453
Printing Telegraph, Simple, Prints on Tape 440
Prints, Glossy Photographic, How to Make .. 805
Prints, Judging for Good Sepia Tones ... 961
Prints, Preventing Discoloration of ... 796
Prints, Transferring to Glass ... 155
Prison, Great Military, Off San Francisco ... 702
Prize Awarded Discoverer of Harmless Opiate ... 41
Prize Awarded for Blocks Buried in Beach Sand ... 120
Prize Contest, Rubber, Gives 10,000 Ideas as to Its Use ... 234
Prize Offers:
Airplane Efficiency, Trophy Awarded for .. 323
Airplane, Man Propelled, that Can Hop 164 Feet ... 651
Airplane Motor, Best ... 159
Automobile Driver, Reckless, Best Name for ... 980
Book, Highest Literary ... 487
Bungalow Furnishing, Best ... 159
Cattle Show, Better-Bred ... 815
Civic Achievement ... 979
Cleansing Cream, Best Household Uses for 980
Editorial Contest, Intercollegiate ... 323
Electricity, Best Work on ... 980
Essays, American History ... 487
Essays, Good Road, University Scholarship Offered for ... 815
Essays on George Washington ... 159
Essays on Life of Roosevelt ... 488
Essays to Encourage Temperance Study in Schools ... 980
Household Expenses, Best Management System for ... 980
Municipal Management, Best Suggestions for ... 324
Name, Lucky, as Decided by Horoscope ... 651
Needlework ... 159
Newspaper Questions, Answers to ... 159
Petroleum Oil, Australian, Discovery of .. 488
Pig Raising ... 651
Pike's Peak Automobile Race ... 979
Plays, Local and Present Day Life ... 979
Poem, Best College Undergraduate ... 980
Poem, "Spirit of Transportation" ... 979
Posters, Kindness to Animals ... 651, 815
Razor Slogan, Best ... 159
Roads, Good, Trophy Awarded for ... 487
Shoe Polish, Best List of Uses for ... 651
Song Setting, Best ... 651
Spines, Best Human ... 980
Yards, Best ... 487
Progress—Days of '76 and Now, by H. H. ...
Projectile Pistol Is Life Saving Appliance .. 728
Projector, Movie Film, Hand Flashlight as .. 173
Propeller Bearing for Model Airplane ... 646
Propeller, Old, as Boat Anchor ... 479
Propeller, Self Adjustable, for Wind or Engine Drive ... 202
Propellers Circulate Air to Heat Orange Grove ... 902
Propellers, Drilling and Stud Setting Machines for ... 234
Proportioner, Concrete, Automatically Proportions by Weight ... 387
Props, Coal Mine, Tree Planting for ... 418
Protection of Magicians, by H. H. Windsor .. 845
Protector, Emergency Rain ... 603
Public Service Invention, Workman Awarded Medal for ... 487
Public Taste Studied in Training of Buyers 119
Pull Chain, Electric Light, Extension for ... 318
Puller, Ball Bearing ... 463
Puller, Screwjack Gear ... 481
Pulley, Small, Keying to Motor ... 616
Pulleys, Belt, Silent Chain Sprockets as 782
Pulleys, Stretching Leather Lagging on 294
Pullman Cars, First Aid Packets Carried Visibly on ... 506
Pulp Mill, German Paper, in Argentina 375
Pump, Electric Washer, for Emptying Water 931
Pump, Fuel, Fits any Barrel or Drum 694
Pump, Homemade, for Shallow Wells 800
Pump Jack Repaired for Engine Drive 782
Pump, Mommoth, Has 4,000,000 Gallon Capacity ... 270
Pump, Rubber Lined, Has Great Durability 431
Pump, Tire, and Radiator Fan Combination 166
Pump, Tire, Revolving Cylinder ... 383
Pumping Machine for Emptying Canals 408
Pumps, High Power Turbine, on Auto Makes Effective Fire Engine ... 677
Pumps, Suction, Empty Auto Gas Tanks before Shipping ... 678
Pumps, Why They become Air Bound 455
Punch and Die, Easily Made ... 952
Punch Attachment, Center, for Square 943
Punch Made from Letter Press ... 777
Punch Press, Simple Guard for ... 454
Punch Presses, Safety Device for ... 137
Punch Spring, Rubber Stopper Used as 972
Punching in the Lathe ... 788
Push Car, Monorail, for Use on Farms 910
Pushball Game Affords Novel Entertainment at Carnival ... 62
Pushball Game, Boy Scout, in San Diego, Calif. ... 280
Pyrometer, Thermoelectric, Has Self-Compensation ... 46

Quartz Crystals Furnish Standard for High Temperatures, by C. A. Briggs ... 324
Questions, Newspaper, Prizes Offered for Answers to ... 159

Rabbit Sitting in Tree ... 936
Rabbits as Protection from Mosquitoes 162
Race, Dog Team, Great American ... 751
Race, Foot, Movie Athlete Defeats Horse in. 232
Race, International Fisherman's, Canadian Schooner "Bluenose" Wins ... 39
Race Puller, Ball Bearing ... 463
Race, Slow Automobile, Is Novel Test 54
Races, Fourth Annual Pikes Peak, Announcement of ... 979
Racing Auto, Special, Has Narrow Body 704
Rack, Bakery, for Touring Car ... 287
Rack for Steel Stock Boxes ... 792
Rack for Storing Sheet Glass ... 451
Rack, Garage Road Test, for Autos ... 73
Rack, Unloading, Quickly Empties Oil Tank Cars ... 44
Radiator Cap and Thermometer Locking Device ... 193
Radiator Cap, Lock for ... 317
Raditor Cover, Cloth, Keeps Walls Clean 932
Radiator, Electric Window, Prevents Frost .. 725
Radiator Filling Bucket, Improved ... 637
Radiator Fins, Bent, Tool for Straightening 252
Radiator Footrail, Detachable ... 308
Radiator Testing, Old Valves as Plugs for ... 298
Radiator Truss, Auto, Is Cheap and Easy Repair ... 433
Radiator Valve Attachment for Steam Heated Rooms ... 525
Radiator Valve, Steam, Humidifies the Air .. 113
Radiator Warmer, Electric Auto, Prevents Water Freezing ... 578
Radiators, Auto, Condenser for ... 798
Raditors, Wall, Adjustable Hanger for 404
Radiographs, Flash Timing Arrangement for Making ... 692
Radiophones to Aid Crime Detection 489
Radium Bearing Minerals Found on British Columbia Islands, by Francis Dickie 335
Radium Clinic, First City, for Rich and Poor, by Douglas C. Miner ... 592
Radius Cutting Tool, Simple, for Lathe 301
Rags Old, to be Used in New Roofing 738
Rail, Old Steel, Convenient Anvil or Trestle Made from ... 622
Railroad, Alaskan, from Seward to Fairbanks Named ... 935
Railroad, Alaskan, Opened from Seward to Fairbanks ... 388
Railroad—Brake Rod Slack Adjuster, Automatic ... 891
Railroad Bridge Construction in a Treacherous Mexican River ... 384
Railroad Bridge, Two-Span, Over River in Washington ... 924
Railroad, Canadian Pacific, to Resume Work on Vancouver Pier ... 699
Railroad Car Bulk-Grain Loader, Simple Inexpensive ... 68
Railroad Car Bumper, Automatic, Prevents Collisions ... 522
Railroad Car Wheels Made in Revolving Mold ... 26
Railroad—Carfare Problem, Double, Solved by Ingenious Plan ... 441
Railroad Cars, Automatic Hose Coupler for .. 71
Railroad Cars, Roller Bearing Axles on 42
Railroad—Cars, Thermos, for Transporting Milk ... 6

Railroad Cars, Wooden, Have Longer Life Than Steel 920
Railroad Coal Bill Reduced by Constant Reminders 66
Railroad—Creosoting Tube, Immense, Makes Freak Shipment 674
Railroad Crossing Signal, New Type..... 389
Railroad Diner, English, Electrically Equipped 856
Railroad Ditching Machine Displaces Many Men 873
Railroad—Electric Train, Russian, High Powered 675
Railroad—Electric Train, Wireless Installed on 352
Railroad Freight, Poison Gas Chambers Disinfect, by S. R. Winters..... 595
Railroad Fuel Problem, French, Coal Dust Briquettes Solve 378
Railroad Gasoline Speeder for Combating Forest Fires 566
Railroad Handcar, High Speed, Built by Section Foreman 52
Railroad, Highest, of British Empire to Cross Rich Region..... 74
Railroad Ice Harvesting in the Mississippi, by F. L. Clark..... 373
Railroad Inspection Car, Lightweight..... 544
Railroad—Locomotive, Double Drive, with Boiler in Center..... 820
Railroad—Locomotive Explodes with Unusual Violence 907
Railroad—Locomotive Pinned to River Bed by Piling, Salvaging..... 378
Railroad—Locomotive Pulls 112 Loaded Cars as Demonstration Feat..... 443
Railroad—Locomotive Smoke Consumer of Canadian Design 605
Railroad — Locomotive, Strange Type, in Himalaya Mountains 863
Railroad Locomotive Terminal Snow, Canadian, Disposed of by Steam Coils..... 191
Railroad—Locomotive Throttle Lever with New Safety Catch..... 590
Railroad Locomotive, Toy Coal Burning, 20 Inches Long 536
Railroad—Locomotive, Wild, Plunges into Turntable Pit 697
Railroad — Locomotives, Automatic Fire Door for 193
Railroad — Locomotives, Large American, Chinese Railway Buys..... 4
Railroad — Locomotives, Seven, Pull Long Test Train to Ridge of Continental Divide, by Geo. F. Paul..... 331
Railroad — Locomotives, Smokiest, Made Smokeless 161
Railroad, Modern, Ancient Mountain Highway Becomes 879
Railroad, Morocco, Changed to Normal Gauge 366
Railroad, Motor Truck, on Hetch Hetchy Line 419
Railroad—Pullman Cars, First Aid Packets Carried Visibly on..... 506
Railroad Rails, 100 Tons of, Made into Souvenirs 175
Railroad—Refrigerator Cars Converted for Winter Use 769
Railroad Sheep Shelter, Large Capacity.... 429
Railroad Signals, Improved, Insure Safety if Broken 64
Railroad — Staff Brake, High Power, for Freight and Passenger Cars..... 736
Railroad Station Foundation Tests, Astonishing Results of, by Henry S. White.... 653
Railroad Station Piers, Epoch Making Tests of, by Henry S. White..... 23
Railroad—Suburban Train Passengers, Late Paris, Given Slips of Arrival Upon Request 344
Railroad, Swiss, Turbine Locomotive for.... 183
Railroad Tank Cars, Inside Pressure of, Greater When Standing..... 500
Railroad Tank Cars, Unloading Rack Quickly Empties 44
Railroad Ticket Selling Device Dates, Clips, and Registers the Amount..... 360
Railroad—Tie Changing Machine, Rapid, Economical 695
Railroad Ties, Perforating Machine for..... 51
Railroad Track Torpedo Appeals to Sight, Smell, and Hearing..... 171
Railroad—Train, Motion Picture Film Prepared on, by Jack A. Bristol..... 420
Railroad—Train Transports Snow for Skiing 363
Railroad — Trains, Freight or Passenger, Electric Signal for..... 36
Railroad—Trains, Russian, Distributes Radical Literature 237
Railroad Trains, Wireless Telephone Installed on 842
Railroad Tunnel Bore Enlarged without Stopping Traffic 586
Railroad—Weather Map Used to Save Money When Placing Ties..... 65
Railroad Wreck, Locomotive Thrown up Side of Hill in..... 172
Railroads, Government Owned, France to Sell 906
Rails, 100 Tons of, Made into Souvenirs..... 175
Rain Protector, Emergency..... 603
Raindrop, German Automobile Shaped like.. 690
Rake, Self Cleaning Lawn, to Aid Gardener 515
Range, Electric, Has Switch with Two Pilot Lamps 45
Range Finder, Huge British, Has Range of 22 Miles..... 684
Range, Gas, Has Novel Burner and Cast Iron Top 588
Rat Trap, New Style, Catches and Drowns.. 736
Rat Trap, Shooting, as Burglar Alarm..... 482
Ratchet Crank, Lumber Truck, Facilitates Unloading 758
Ratchet Wrench, Convenient..... 124
Rate Changes, New, for Foreign Money Orders 246
Rats, European, Endless Chain of Poison Kills 82
Rats, Trapping without Bait..... 977
Rattlesnakes Killed with Poison War Gas.. 204
Razor Blades as Filing Guard..... 449
Razor Slogan, Best, Prizes Offered for..... 159
Razor Strop for Campers..... 804
Razors, Electric Sterilizer for..... 564
Reading Machine Makes Pocket Library Possible 677
Reading Matter, Radical, Distributed by Russian Government 237
Real Estate, Foreign Treaties Allows Foreigners to Hold..... 356
Reamer and Tap Milling Fixture..... 296
Reamer, Valve Seat, Improved..... 613
Reamers, Holder for Protecting..... 629
Reamers, Taper, Stop for..... 618
Reaming Machines, Homemade Cylinder.... 620
Receiver, Short-Wave Radio Telephone, How to Make 963
Receiver, Wireless, Shaped Like Human Ear 105
Receivers, Ordinary, Used with Radio Amplifier 736
Recoil Pad, Military Rifle, Passes Severe Tests 340
Reconstruction Work in Paris..... 89
Record Lifting Disk, Phonograph..... 38
Recorder, Dial, Shape Irregularities Shown by 240
Recorder, Expense and Mileage, for Motorists 260
Recording Instrument for Air Effects in Furnace Gases 73
Records, Ethiopian, Boston-Harvard Expedition Finds 172
Records, Phonograph, Hang Up Filing Envelopes for 768
Records, Phonograph, How Made, by Alexander H. Kolbe..... 581
Records, Phonograph, Made of Actual Grand Opera 42
Records, Phonograph, Wireless Messages Received on 920
Red, Fire Engine, Prohibited on Chicago Private Autos 238
Red, Venetian, Best Color for Outside Woodwork 134
Redwood, Steam Operated Ax for Chopping 906
Reel for Drawing Paper..... 125
Refacing Lathe, Valve, Is Highly Efficient.. 117
Reflecting Device for Reflecting Views of Objects 716
Reflection—Building Perfectly Portrayed in Water 372
Reflections, Distorted, Photographed from Boat 744
Reflector, Cheap, for Home Photography... 812
Reflector, Light, for Drafting..... 301

Reflector, New, Brilliant Light Obtained with 688
Reflector Plates, "Forming" Electrolytic.... 646
Refrigerating System, Testing New..... 462
Refrigeration Plant, Home, Simple and Noiseless 823
Refrigerator Cars Converted for Winter Use 769
Refrigerator Drain Pipe Brush..... 439
Refuse Can, Two Shell, Disinfects Garbage. 277
Refuse, City, Island Made from, by Wm. B. Goodwin 740
Refuse Container, Steel, Made Ornamental.. 760
Refuse, Lumber, 700 Foot Suction Pipe-Line Conveys 746
Register, Furnace, Combination Wall and Floor 253
Register Seat, Furnace..... 157
Regulations, Fire, Safeguarding Ships..... 118
Regulations, Garage Zoning, Tested by Application 173
Regulator, Simple Windmill..... 136
Regulator to Control Gases in Operation of Torches 118
Rehabilitation, Industrial, of Workers, by Wm. A. McGarry..... 33
Reindeer Acclimatized in Baffin Land..... 360
Reindeer Raising Attempted in Michigan... 742
Relativity, Theory of, to be Further Tested 588
Releaser for Kite Parachutes..... 962
Relic—Ax Head, Copper and Zinc, Made by Inca Indians 743
Repair Hoist, Auto, Replaces Repair Pit.... 529
"Repair It Now" Campaign for Auto Owners 816
Repair Truck, Telephone, with Novel Features 68
Repair Truck Transports Men and Material. 249
Repairing Fixture for Lawn Mowers..... 789
Reports, Stock Exchange, Sent by Wireless Telephone 372
Reproducer, Loud-Speaking, for Dictaphone Records 871
Reproducing Apparatus, New Wireless..... 827
Reptiles—Crocodiles, Borneo Inhabitants Eat Flesh of..... 752
Rescue Rope Fired from Gun..... 1
Rescue Work, Clever, of Workman Marooned on Smokestack..... 162
Rescue Work with Breeches Buoy from Agrounded Ship 543
Research, Scientific, Field Museum Expeditions of 596
Reservoir, Colossal Gas, Holds 15,000,000 Cubic Feet 32
Reservoir Cover, Roller and Ice Skating on 312
Reservoir, Roofed Water, Provides Tennis Courts 233
Reservoir Wall Blows Out Tearing Huge Gap 590
Reservoir, 25,000,000,000 Gallon Water, for New York 224
Resin, Powdered, as Soldering Flux..... 632
Resist, Improved, for Etching..... 632
Resistance Coil, Simple Electrical..... 635
Resonator, Banjo, Amplifies Its Volume Snappily 932
Restaurant, Yosemite Park, Popular with Tourists 261
Retainer, Rubber, on Flue Beading Tool.... 757
Retarder for Bowling Balls..... 317
Reversing Device for Small Motorboat..... 579
Revolver, 16 Shot, Made in Belgium..... 261
Revolver, 20 Gauge Shot, by Capt. Edward C. Crossman 405
Ribbon Protects Women Traveling Alone... 681
Ribbons, Typewriter, Restoring..... 969
Rice Hulls Converted into Useful Products.. 66
Rice Straw, Louisiana, Used for Making Paper 544
Rice Stripping Machine Collects Rice from Standing Stalks 692
Richardson, Archie: Church, Shreveport, Has Many Unusual Features..... 866
Ridgepole Seat, Comfortable..... 307
Rifle Barrel Bore, Polishing..... 472
Rifle Recoil Pad, Military, Passes Severe Tests 340
Rifle Shot, Crack, Man Lacking Arm and Hands Is 528
Right of Way Signaling Device for Autos.. 577
Rim Contractor and Jack Combined..... 911
Rims, Demountable, Holder for..... 804
Rims, Demountable, Stopping Noise of..... 479
Ring, Divorce, for Grass Widows..... 607
Ring, Snap, Bending Fixture..... 133
Rings, Odd Sized Piston, Grinding..... 791
River, Absolute Control of, with Waterworks Dam 701
River Basin, Ohio, Water Power Expansion in 336
River, Columbia, Icebound Highway of, by H. E. Thomas..... 216
River Course Changed by Single Blast..... 58
River Crossing, English, by Suspended Transporter 60
River Currents, Erratic, New Means of Controlling 831
River Dike, Long, Protects Channel from Drifting Sand 558
River Erosion Prevented by Flexible Concrete Paving, by Ivan E. Houk..... 220
River, Mississippi, Beacon Lights on, by Lewis R. Freeman..... 347
River of Doubt Changed to Roosevelt River 818
River, Skagit, Hydroelectic Power Plant Projected on 342
River Swamps, Southern, Concrete Trestles to Cross 98
River Terminal, Municipal, Erected at Nashville 737
River, Treacherous Mexican, Bridge Construction in 384
Rivet Forge, Oil Burning Portable..... 106
Rivet Machine, Tubular, Has Ingenious Telltale 353
Riveting Anvil, Handy..... 141
Riveting Kink 951
Rivets, Brake Band, Chisel Improvised for Cutting 294
Rivets, Shortening in Quantities..... 780
Road and Stream Share Mountain Tunnel... 99
Road Base Material, Tar Sand Tested for.... 493
Road—Beach, Sixty Mile, as Tractor Route. 896
Road Building Train, Motor Truck Transports 242
Road Construction, Cost of..... 432
Road Crossing, Triple Risk..... 433
Road, Desert, Fenced to Guide Motorists.... 666
Road Essays, Good, University Scholarship Offered for 815
Road Gateway, Attractive, Warns Motorists of Town 434
Road Grader, Gasoline, Cuts Eight Inch Trench 703
Road Grader, Tractor, Simple and Economical 413
Road Graders, Two, Pulled Abreast by Tractor 371
Road Maintenance Plan, New, Suggested in Manitoba 552
Road Map, Moving, Operated by Speedometer 523
Road Paving, Average Cost of..... 674
Road Pedestrians, Country, Safety First Cards Teach 122
Road Repairing Machine Resembles Pile Driver 763
Road Roller, 3 Wheel, Has Engine at Rear.. 905
Road, Sandy Shore, Made of Sectional Planking 589
Road Sign, Lighthouse, in New Jersey..... 927
Road Signs Protected by U. S. Forest Service and State Auto Association..... 380
Road Signs, Richmond's Auto, Warns and Invites 108
Road Signs, State Trunk, Have Numbers.... 109
Road Snowplow, Rotary, Driven by Tractor .500
Road Test, Automobiles Given in Garage.... 73
Road Tests Made with Tunnels Beneath Them 86
Road Trophy, Good, Auto Club Awards..... 487
Road, Wisconsin State, Wayside Shrine on.. 926
Road Work, Concrete, Special Trowel for.. 459
Roadbuilding — Concrete Highway, Amount of, Laid in 1921..... 354
Roadbuilding, State, War Surplus Materials for 4
Roads, Concrete, Float Bridge Aids in Building 882
Robbers, Shooting Device for Protection Against 818
Rock Bursts in Metal Mines Experimentally Prevented with Use of Cement Spray Gun. 415
Rocker Lever for Overhead Valves..... 158
Rocker Lever for Overhead Valves Patented 781
Rocking Chair, Felt Tires for..... 642
Rocks—Boulders Give Forth Music..... 110
Rodents, Trapping without Bait..... 977
Rods, Round, Center Marking on..... 300
Roll-Changing Machine Used in Making Roofing 911
Roller and Ice Skating on Reservoir Cover.. 412

Roller Bearing Axles on Railroad Cars..... 42
Roller Bearings, Staggered, for Heavy Duty 750
Roller for Decorators' Stencils..... 286
Roller Skate Aids Moving of Furniture..... 973
Roller, Soil, Made from Mower Wheels..... 486
Roller, 3 Wheel Road, Has Engine at Rear.. 905
Rollers, Rubber, on Golf Course Sprinkler.. 716
Rolling Pin for Use with One Hand..... 767
Rolls, Machine, Guards for..... 781
Rolls, Player Piano, Repairing..... 969
Roof, Copper, 510 Years Old and Still Good.. 53
Roof, Durable, Interlocking Copper Shingles Form 528
Roof Ridgepole Seat, Comfortable..... 307
Roof, Use of, is Latest Garage Economy.... 404
Roofing Material Tested in Exposure Parks. 923
Roofing, New Prepared, Old Rags to be Used in Making 738
Roofing Paper, Fastening under Eaves..... 643
Roofing, Roll-Changing Machine Used in Making 911
Roofing, Sheet Metal, Cut with Handsaw... 782
Roofs, Pure Lead, Not Durable..... 558
Room Space, "Built In" Drawers Save..... 960
Roosevelt Junior Memberships Offered by Woman's Memorial Association..... 488
Rope, Automobile Tire, Replaces Chains.... 891
Rope, Breaking Strength of, Formula for.. 789
Rope Clotheslines, Waterproofing..... 151
Rope Eye Splice, Superior..... 288
Rope—Lariat Throwing..... 801
Rope, Steel Knot Tow, for Autos and Trucks 610
Rope Throwing Gun..... 1
Rope Tie, Automatic Manger..... 468
Rose Garden Model for Portland, Oregon.... 109
Rose Tree, Metal, Made with Welding Torch 378
Round Stock, Holding in Vise..... 618
Royalties, Oil and Gas, on Government Owned Land for 1921..... 726
Rubber as Paper Making Material by New Process 227
Rubber Boot for Children Slips Over Shoes.. 273
Rubber Caps, Dust Proof, for Automobile Tire Valves 367
Rubber Contest Gives 10,000 Ideas as to Its Use 234
Rubber Heels, Snap On..... 390
Rubber Latex, Tensile Strength of Paper Increased by 499
Rubber Lined Pump Has Great Durability.. 431
Rubber Mat Made from Inner Tubes..... 649
Rubber Pencil Grip Prevents Slipping..... 890
Rubber Retainer on Flue Beading Tool..... 757
Rubber Rollers on Golf Course Sprinkler... 716
Rubber Soles, Raw, Used on English Sport Shoes 90
Rubber Solution Removes Stains on Leather 906
Rubber Stamps for Floor Layouts..... 777
Rubber Stopper Used on Punch Spring..... 972
Rubber Tires for Wooden Wheels..... 643
Rubber Tubes, Corrugated, for Auto Tires.. 869
Rubber Tubing Protects Clothes from Moths and Dust 248
Rubber Washbowl, Portable, for Travelers.. 690
Rudder, Boat, for Shoal Water..... 978
Rudder, Expanding, Acts Like Emergency Brake 119
Rugs, Grass, Rejuvenating..... 799
Rugs, Paper Shipping Tubes for..... 905
Ruins, Ancient Armageddon to be Explored 565
Ruins, Ancient, Excavations of, by R. P. Crawford 537
Ruins of Colophon, Excavations to be Made at 934
Rusk, Rogers D.: X-Rays Reveal Atomic Structure of Matter..... 111
Rust, Pipe, Oxygen Removed from Water to Prevent 744

Safe, Collapsible Desk Contained in..... 101
Safety Attachment for Printing Press..... 455
Safety Catch, Locomotive Throttle Lever... 590
Safety Code, New, Pertaining to Grinding Wheels 765
Safety Contest, Factory, to Boost Inspectors 274
Safety Deposit Vault Floors Lowered and Raised by Motors..... 186
Safety Deposit Vaults, Building, by T. Benjamin Faucett 376
Safety Drill and Tap Chuck Protects Tools.. 748
Safety First:
Accident Parade in Syracuse, New York.. 392
Acetylene Tanks, Locating Leaks in..... 141
Safety First: (Continued)
Airplane Stability Tests to Make Flying Safe 52
Alcohol, Wood, Using..... 140
Automobile Driving at Night in Rain or Snow 958
Cards Teach County Road Pedestrians.... 122
Electric Candle in Wreath Minimizes Fire Risk 218
Engines, Fluctuating Load, should Have Speed Limiting Device..... 793
Fire Regulations Safeguarding Ships..... 118
Flood Warnings, Amplifiers to Give, by H. A. Lane..... 9
Gates, Sidewalk Elevator, Prevent Accidents 8
Guard for Machine Rolls..... 781
Guard Plate for Knife Switch..... 943
Guards, Safety, for Milling Machines and Drill Presses 454
Lock and Chain to Prevent Accidents..... 296
Printing Press Safety Attachment..... 455
Punch Presses, Safety Device for..... 137
Seawall, Fool-Proof, Has Sharp Edged Top 47
Switches, Knife, Mounted in Safe Position 616
Traffic Protected by Red Bands in Paris Streets 89
Safety Island, Detroit, Has Two Signal Globes 598
Safety Light Signal Code for Autos..... 593
Safety Men in Mining Industry, Census to Show Exact Number of..... 652
Safety Razor Blades as Filing Guard..... 449
Sail Boat, Model, Made of Paper..... 279
Sailor Wind Vane..... 473
Sal Ammoniac, Preventing Iron Corrosion in Manufacturing 878
Salade, Robert F.: Bridge, Delaware River, New 555
Sales Tax, The, by H. H. Windsor.....28, 188
Salesman, Drill Press, Mounts Drill on Auto 246
Salesman, Tractor, Movies in Home of Farmer Act as..... 493
Salt and Pepper Shakers Open by Pressure on Top 438
Sample Fair, Sixth Swiss, to be Held at Basle 652
Sand Blast Process for Making Hollow Steel 238
Sand Cutting Machine, Hand Propelled, for Foundries 534
Sand, Magnetic, High Grade Iron Produced from 66
Sand Raised from Beach by Road Tractor Hoist 551
Sand, Tar, Tested for Road Base Material.. 493
Sandpaper, Imitation Concrete Blocks Made of 408
Sandpaper Used for Bushings..... 322
Sardine Fishing Boats Increase in Number and Efficiency 245
Sash, New Window, for Cleaning Both Sides from Inside 610
Saturn's Rings Will be Dispersed by Its Satellites, by C. A. Briggs..... 488
Savings Bank, Home, Combined in Desk Watch 890
Saw, Circular, Mounted on Auto Proves Profitable 411
Saw, Circular, on Tractor for Clearing Land 576
Saw, Circular, Spring Guide for..... 464
Saw Filing Kink..... 941
Saw, Hand, Cutting Sheet Metal with..... 782
Saw, Horizontal Band, Metal Cutter Has.... 31
Saw, Motor Driven, for Felling Trees..... 508
Saw, Portable Bench, Cuts Miters Any Angle 933
Saw, Power Driven Circular, for Ice Harvesting 214
Saw, Shaper, Complicated Work Done with. 894
Saw Teeth, Metal Cutting, Special Wheel Cleans 554
Sawdust Converted into Cattle Food by Chemical Process 863
Sawhorse for Uneven Floors..... 625
Sawing, Wood, Dogs Aid in..... 297
Saws, Band, Window Box Aids in Filing... 302
Saws, Carpenter's, Inner Tubes Protect..... 636
Saws, Milling, Preventing Breakage of..... 626
Scaffold, Clever Dome, for Interior Painting 869
Scaffold, Substantial, without Nailing to House 787
Scaffolding for Repairing Paris Trinity Church 89
Scale Attachment for Setting Calipers..... 940

Scale Holder, Simple ... 624
Scale, New Form of, Weighs Rubber Tires ... 732
Scale, Novel Machinists' ... 462
Scale Registers Weight of Beehives ... 542
Scale Used as Depth Gauge ... 949
Scales, Square Made from ... 137
Scenario Stories, Prizes for ... 323
Scene, Rustic, Perfectly Portrayed in Water ... 372
Scenery, Reversible, for Outdoor Theater, by John Anson Ford ... 95
Scenes, Berlin Stage, Rapid Method of Changing ... 910
Scholarship, University, Offered for Good Road Essays ... 815
School Bridge, Arched, as Memorial to War Veterans ... 926
School, Chicago, Wireless Telephone in ... 936
School Children, Pencil and Pen Case for ... 609
School Desk Bookholder, Made of Bent Iron Wire ... 692
School Pupils Model Village of Plymouth ... 936, 937
School Students, Automobile Made by ... 926
School Training for Public Taste of Buyers ... 119
School—University Scholarship Offered for Good Road Essays ... 815
Schools, Motion Picture Films to Teach History in ... 882
Schooner "Bluenose," Canadian, Wins Race ... 39
Schooner, Challenger Fishing, Launching ... 698
Scientific Research, Field Museum Expeditions of ... 596
Scientists, Government, Study Land Requirements ... 57
Scientists Study Influence of High Altitude on Life ... 54
Scoop, Coin Collecting Appliance Shaped like ... 900
Scoop, Grain, Made from Washboiler ... 469
Scooter, Kiddie, Convertible into Walking Stick ... 120
Scorching Pen Prevents Forgery ... 231
Scout, Boy, Pushball Game in San Diego, Calif. ... 280
Scouts, Boy, Have Fireplace for Study of Geology ... 94
Scow, Automobile Propels ... 113
Scow, Floored, as Auto Ferry ... 84
Scraper, Battery, for Removing Old Compound ... 440
Scraper, Battery Terminal ... 287
Scraper, Boot, Made of Wire ... 304
Scraper, Dinner Plate, Easily Made ... 313
Scraper, Dish, Rubber Blade ... 930
Scraper, Floor, Improvised ... 481
Scraper, Foot, Homemade ... 960
Scraper, Shellfish ... 438
Screen Door Catch Can be Securely Locked ... 569
Screen Door Hinge, Permanent Fastenings for ... 972
Screen Keeps Fish Out of Irrigation Ditches ... 117
Screen, Wire, for Cooling Bread and Cake ... 766
Screen Wire, How to Apply ... 798
Screen Wire Pulled Taut with Carpet Stretcher ... 976
Screening Center-Pivoted Windows ... 978
Screenings, Coal, Stored in Old Clay Pit ... 241
Screenings, Grain Elevator, Sheep Fattened on ... 586
Screw Hooks, Screwdriver Attachment for Inserting ... 947
Screwdriver, Adjustable Handle ... 908
Screwdriver Attachment for Inserting Screw Hooks ... 947
Screwdriver, Geared Offset ... 286
Screwdrivers, Small, Made from Buttonhooks ... 644
Screwjack Gear Puller ... 481
Screws and Nails, Made to Drive Easily ... 465
Screws, Hinge, Accurate Holes for ... 141
Screws, Removing Tight ... 789
Screws, Small, Old Fork for Placing ... 623
Scribing Instrument, Miter, for Irregular Surfaces ... 860
Scribing Long Straight Lines ... 951
Scribing Tool, Precision ... 298
Scrolls, Curve Cutting Knife for ... 326
Sculpture Carving from Photographs ... 204
Sea Life, Hermit Sells to Movie Firms ... 91
Sea Lions Play Havoc with Fishing Industries ... 674
Seal, Baby, Forced to Eat When on Hunger Strike ... 609
Seal Hand Press Made into Foot Press ... 871
Sealing and Tying Machine, Package, by Robert H. Moulton ... 532
Sealing Machine, Electric ... 418
Sealing Wax Applier, Electric ... 100
Seals, Migrating, Travel in Military Formation ... 237
Seals Play Havoc with Fishing Industry ... 674
Seaplane Flight, Trans-Ocean, by H. H. Windsor ... 845
Seaplane, Mono, being Tested at Rockaway Air Station ... 105
Seaplane, Wrecked, Halts Portuguese Airman ... 841
Seaplanes, Spotting, Bids on, Asked by Navy Bureau ... 507
Seashore, Sixty Mile, as Tractor Route ... 896
Seat and Backrest, Comfortable, for Outing ... 565
Seat, Auto, Made More Comfortable ... 797
Seat, Auxiliary Auto, for Child ... 299
Seat, Baby, for Chair or Automobile ... 766
Seat, Comfortable Ridgepole ... 307
Seat, Double, for Golf or Garden ... 122
Seat, Drawerlike Extra, for Auto ... 202
Seat, Extra, for Baby Carriage ... 643
Seat for Furnace Register ... 157
Seat, Garden Weeding, Prevents Backache ... 6
Seats, Ball Check Valve, Grinding ... 301
Seawall, Fool Proof, Has Sharp Edged Top ... 47
Seaweed Collected by Tide Barriers ... 90
Secrets, Magicians', to be Respected ... 651
Seed, Cotton, Treated for Elimination of Diseases ... 886
Seeder, Simple, How to Make ... 971
Semaphore on Transformer Signals Overload ... 508
Sepia Tones, Judging Prints for ... 961
Service Banner Memorial in Geneseo, Ill ... 668
Service Station Oil Dispenser Is Quick and Accurate ... 119
Serving Table, Auto, Stands on Running Board ... 858
Settlement, Abandoned, Reclaimed by Wells, by Horace E. Thomas ... 197
Settlers, Wisconsin's Novel Method of Attracting ... 878
Sewage Channel, Slough becomes, in Portland, Oregon ... 418
Sewer Cap Castings, Making Special ... 619
Sewer Manhole and Street Drain in One Piece ... 859
Sewing Energy Required by Hand and with Machines ... 87
Sewing Machine, Lace, Saves Much Labor ... 669
Sewing Machine Prospects Heralded by Electric Buzzer ... 550
Sewing Machine Table, Slot in, Facilitates Work ... 443
Sewing Pin for Hemming ... 272
Sewing Stand, Easily Made ... 314
Sewing Stand, Trench Helmet as ... 148
Sex Detector, Egg, Lacks Merit ... 554
Shackle Boot Prevents Escape of Criminals ... 525
Shade for Trouble Lamp ... 317
Shade, Roller, on Bootblack Stand ... 724
Shaft Digging Machine and Caisson Sinker ... 98
Shaft Grooves, Repairing Worn ... 136
Shafting, Ladder for Work on ... 612
Shafts, Marking Centers on ... 300
Shakers, Salt and Pepper, Open by Pressure on Top ... 438
Shale, Oil, Bricks Made from ... 330
Shale, Oil, Distillation of, at Low Temperature ... 496
Shamrock Snake Game ... 121
Shape Irregularities Shown by Dial Recorder ... 240
Shaper Feed Pawl, Arrow Cut on Saves Time ... 792
Shaper, Vertical, Modified to Cut Internal Gears ... 759
Shaping Saw, Complicated Shaper Work Done With ... 894
Shark Proof Net Protects Long Distance Swimmer ... 717
Sharpener, Knife, Screws to Wall ... 603
Sharpening Device for Lawn Mowers ... 580
Sharpening Tools with Mill File ... 293
Shearing Pin, Soft, Used in Quick Change Chuck ... 274
Shed, Tool, Carried Across River by Aerial Cableway ... 493
Sheep Fattened on Grain Elevator Screenings ... 586
Sheep Shelter, Railroad, of Large Capacity ... 429
Sheet Metal, Bending Large ... 139
Sheet Metal Roofing, Cutting with Handsaw ... 782
Shelf, Bedstead, for Sick Room ... 971
Shell, Artillery, Lamp Made of ... 322

Shell Bursts Photographed with Long Range Movie Camera 591
Shellfish Scraper 438
Shelling Machine, Piñon Nut..... 606
Shells Hung on German Churches Replace Bells 446
Shelter, Railroad Sheep, of Large Capacity. 429
Shield, Dust, for Plow Wheels..... 638
Shield, Headlight, Aids Auto Driving at Night 894
Shield, Keyboard, Aids Touch Typewriting Students 235
Shields, Egyptian Policemen Carry for Protection 693
Shifter, Automatic Belt, for Grinder..... 942
Shifter, Clutch, Made to Stay "Put"..... 955
Shingle Bolts, Automatic Aerial Conveyor for 860
Shingles, Interlocking Copper, Form Durable Roof 528
Shingles, 500,000 Cut by Mill Daily, by Henry C. Copeland..... 734
Ship Air Ports, Improved, Have no Tumble Bolts 437
Ship "All America" Has Up-to-Date Equipment 4
Ship—Battleship, Giant, Converted into Floating Crane 666
Ship—Battleship "Mutsu," Latest Japanese. 203
Ship Carries Traffic Officer on Bowsprit.... 46
Ship, Communication with, from Telephone Booth 742
Ship, Concrete, Buried to Save Expense.... 747
Ship Hulk, Wrecked, Imitated with Torch.. 380
Ship "Leviathan" Reconditioned as Finest Hotel Afloat 534
Ship Portholes, Circular, Frameless Windows Replace 700
Ship "Quest," Commander of, Dies After Twenty Years of Adventure..... 507
Ship "Quest" Sails from Rio De Janeiro.... 430
Ship Rescue Work with Breeches Buoy Line 543
Ship, Single Deck, Converted into Oil Tanker 56
Ship Telltale, Automatic, Tells Direction of Engine 282
Ship, Twin Screw, Largest All-American-Made 173
Ship U. S. S. "Maryland," Speediest Electrically Driven 22
Ship U. S. S. Memphis, Wreck of, Little Affected by Five Years' Storms..... 97
Ship Ventilator Cowl, Improved, Preserves Cargoes 366
Shipments, Lost, Wireless Used to Trace... 343
Shipping Tubes, Paper, for Rugs..... 905
Ships, Airplane Arresting Tackle for Use on 508
Ships, American, Carry Imports of Egyptian Cotton 196
Ships, Concrete, with Floating Iron Shell being Experimentally Built in Germany.. 688
Ships, Copper-Sheathed, Menace Iron Ones. 917
Ship's Course, Instrument Draws on Chart. 739
Ships, Echo Employed on, for Measuring Ocean Depth 689
Ships, Fire Regulations Safeguarding..... 118
Ships, German Merchant, Enormous Growth of 206
Ships, Naval, Government Saves Fuel Oil on 764
Ships, Radio News Service for, Relating to Derelicts, Floating Wreckage, Misplaced Mines, Buoys, Ice, etc..... 59
Ships—Steamers, Passenger, Portable Altars Installed on 716
Ships, Tank, German U-Boat Hulls Converted into 355
Ships, War, to be Converted into Breakwater 768
Ships, Wooden Hulls of, for Pontoon Bridge 565
Ships, Wrecked, Salvaged with Pontoons.... 341
Shiras, Tom: Hydroelectric Development in Arkansas' 574
Shock Absorber, New, for Autos..... 610
Shoe Leather, Fish and Snake Skins Used as 567
Shoe Polish, Prize Offers for Best List of Uses for 651
Shoe Scraper, Wire..... 304
Shoe Shining Stand Equipped with Wireless Telephone 859
Shoe Shining Stand, Roller Curtain on..... 724
Shoehorn, Broom Holder Made from..... 317
Shoenails Peril Electrical Workers..... 632
Shoes, Bathing, that Snap on in Back..... 603
Shoes, English Sport, Raw Rubber Soles Used on 90
Shoes, Tan, Restoring Color to..... 962
Shooting Device for Protection Against Burglars 818
Shooting Gallery, Toy..... 445
Shopping Bag Can be Folded to Size of Handbag 602
Shotgun Barrel Bore, Polishing..... 472
Shotgun, Making Comfortable..... 649
"Shoveha' Penny" Game Board Improved... 383
Shovel, Brush Hook Made from..... 976
Shovel, Clay Digging, Pneumatic..... 257
Shovel, Novel Power, Gasoline Engine Drives 832
Show, Auto, in China Housed in Bamboo Shed 738
Show, Bench, Oxen Draw Girls and Dogs at 927
Show, Horse, New Kind of, by Frank B. Howe 12
Show, Live Stock, Prizes Offered in..... 815
Showcards, Art Glass as..... 471
Shower Sprinkler on Bathing Beach..... 435
Showers, Artificial, for Fishing..... 645
Shrine, Wayside, on Wisconsin State Highway 926
Shutters, Camera, should not be Oiled..... 650
Shutters, Storm Windows Made from..... 155
Sick Room, Bedstead Shelf for..... 971
Sick Room, Electric Cooker for..... 767
Sick Room, Electric Heater for..... 766
Side Mills, Face Milling with..... 451
Sidecar, Motorcycle, Streamlined Windscreen for 276
Sidewalk, Concrete Block Aids Pedestrians to Mount 435
Sidewalk Construction, Concrete, Faults in. 778
Sidewalk Elevator Gates Prevent Accidents 8
Sieve, Roller, Trout Sorted into Sizes by... 900
Sign Advertises 100 Per Cent Pure Water.. 434
Sign, Crossing, Warns Motorists of Triple Risk 433
Sign, Danger, Simulates Real Auto..... 746
Sign, Doctor's, Made of Pills and Corks.... 122
Sign, Lighthouse Road, in New Jersey..... 927
Sign, Railroad, Reduces Coal Bill..... 66
Sign, Safety Zone, in Springfield, Ill..... 435
Sign, State Line, Between Texas and New Mexico 599
Sign, Street, Compares Number of Fires with Previous Year..... 435
Sign System, "Keep to Your Right," British Columbia Adopts 413
Sign, Traffic, Cannot be Damaged or Knocked Down 279
Signal, Auto, Has Penetrating Light..... 340
Signal, Auto, Informs Driver Which Car Has Right of Way..... 577
Signal Code Light, Safety, for Autos..... 593
Signal, Door, Warns Trucks Loaded too High 270
Signal, Electric, for Freight or Passenger Trains 36
Signal, Improved Railroad, Insures Safety If Broken 64
Signal, New Auto, Gives Warning of Movements 215
Signal, Railroad Crossing, New Type..... 389
Signal—Railroad Track Torpedo Appeals to Smell, Sight, and Hearing..... 171
Signal Shooting Device for Protection Against Burglars 818
Signal, Simple Rear, for Autos..... 306
Signal, Stop, Simple and Practical..... 342
Signal, Street Obstruction, for Day or Night Use 584
Signal Traffic Tower, Improved, for Detroit 44
Signaling Device for Seating Movie Patrons 559
Signaling Glove, Auto, Has Flashlight in Back 253
Signals, Fog, Wireless Controlled..... 236
Signals, Wireless Time, Received at Elgin. 550
Signatures, Nineteen, to Four Power Treaty 189
Signboard, Graphic, Building-Progress Shown with 758
Signboard, Revolving, Propelled by Wind.. 577
Signs Along Parkway to Protect Lawns... 598
Signs, California Road, Protected by U. S. Forest Service and State Auto Association 380
Signs, Parking Restriction, in San Francisco, Calif. 268
Signs, Richmond's Auto Highway, Warns and Invites 108

Signs, Soldiers' Memorial Trees Protected by ... 268
Signs, State Trunk Highway, Have Numbers ... 109
Signs, Traffic, Painted Across Street in Oakland, Calif. ... 599
Signs, Trees Along Boulevard Protected by ... 269
Silencer, Air Craft Engine, of Swiss Design ... 490
Silencer for Home Lighting Plants ... 158
Silicon Alloy, Iron, Melted by Chemical Heat ... 560
Silk and Wool Goods, Testing ... 811
Silk, Real and Artificial, Testing ... 797
Silk Unreeling Machine Invented by Italian ... 520
Silo Top Made of Hinged Segments ... 918
Silos, Creosoted Wood ... 784
Silver Cathodes, Cleaning ... 448
Silver, Cleaning Tarnished ... 799
Silver Recovered from Fixing Bath by New Process ... 230
Siphon, Laundry, Made from Grease Gun ... 315
Sirup, Sorghum, Manufactured by Improved Method ... 192
Size for Porous Walls ... 461
Skate, Roller, Aids Moving of Furniture ... 973
Skaters, Safety Ladder Apparatus to Rescue ... 506
Skating Rink, Ice, Portable Lunch Booth on ... 499
Skating, Roller and Ice, on Reservoir Cover ... 312
Ski Jumping, Championship Exhibition of ... 357
Skid for Use on Steps ... 941
Skiing Snow Transported by Train ... 363
Skinning Gambrel, Simple ... 322
Skinning Knife, Hunter's, Prevents Cutting Hides ... 658
Skins, Fish and Snake, Used as Shoe Leather ... 567
Skirt Aid for Feminine Auto Drivers ... 316
Skull, Prehistoric Human, of New Type Discovered ... 190
Slack Adjuster, Automatic, for Brake Rods ... 891
Slack Puller Replaces Block and Tackle ... 890
"Slackers," Few Real, in List of Draft Evaders ... 85
Slate and Marble, Drill for ... 793
Sled, Auto, Motorcycle Transformed into ... 41
Sled Has Fifth Runner for Steering ... 608
Sled, Limousine, for Winter Touring ... 125
Sled, Motor, Has Wheels for Climbing Hills ... 415
Sled, Motorcycle, How to Make ... 474
Sled, Powerful Aero ... 305
Sled Propelled by Moving Handle ... 773
Sled Sprinkler Makes Roads Icy for Logging ... 430
Sled—Toboggan, Motor, for Snow Covered Roads ... 731
Sleet Thawed from Wires by Short Circuit ... 344
Sleeve, Rubber Pencil, Prevents Slipping ... 890
Sleigh Runners, Baby Carriage, Made of Gas Pipe ... 313
Slicer, Vegetable, Can be Clamped to Table ... 115
Slingshot Made of Aluminum ... 937
Slogan, Best Razor, Prizes Offered for ... 159
Slotting Hacksaw, Special ... 615
Slough becomes Sewage Channel in Portland, Oregon ... 418
Slow Race Is Novel Auto Test ... 54
Slug Holder, Handy Telephone ... 273
Smoke Consumer, Locomotive, of Canadian Design ... 605
Smoke Consumers on Locomotives ... 161
Smoker, Automatic Pipe, for Testing Tobacco ... 432
Smokestack, Steeplejack Climbs with Aid of Box Kite ... 214
Smokestack, Two Section, Erected with Crane ... 182
Smokestack Workman, Marooned, Clever Rescue Work of ... 162
Smokestack, Worn Out Steel, Wrecking ... 718
Smokestack, Wrecked in 55 Minutes by New Method ... 277
Smokestacks, Concrete, Erected Rapidly ... 37
Smokestacks, Steel, Wrecked by 40 Mile Wind ... 102
Smoothing Belt Aids in Building Concrete Roads ... 882
Smuggler's Boat, Clever Dumping Device on, by Lawrence Wm. Pedrose ... 391
Snake and Fish Skins Used as Shoe Leather ... 567
Snake, Flowered Reproduction of, on Roadside of Lonely Cottage ... 599
Snake Game, Shamrock ... 121
Snakes Killed with Poison War Gas ... 204
Snap Fasteners, Easily Attached ... 272
Snap Ring Bending Fixture ... 133
Snow and Ice Storm, Columbia River, by H. E. Thomas ... 216
Snow Bound Cities Reach Outer World by Radio ... 668
Snow Building Blocks, How to Make ... 307
Snow, Canadian Engine Terminal, Disposed of by Steam Coils ... 191
Snow, Melting with Flame Throwing Machine ... 325
Snow Shoveler, Mechanical Highway ... 585
Snow, Skiing, Transported by Train ... 363
Snow Sprinkler, Bobsled, Makes Roads Icy for Logging ... 430
Snow Transported in California for Kiddies ... 936
Snowflakes, Photographing ... 309
Snowplow, Endless Tread Tractor as ... 393
Snowplow, Rotary, for Roads Driven by Tractor ... 500
Snowplow, Tractor Combined, for City Streets ... 915
Soap as Lubricant for Drilling ... 618
Soap Bubble Scene for Movie Ballet ... 339
Soap Bubbles, Used to Study Explosion of Gases ... 910
Soap, Circus Parade Carved from ... 445
Soap Dish as Auto Fitting ... 155
Soap, Soft, Grease Cup as Container for ... 941
Socket Wrench, Adjustable for Various Size Nuts ... 752
Socket Wrench, Double Grip, for Auto Use ... 596
Sod, Cutting Around Trees ... 974
Sod Cutting Machine Preserves Lawn ... 446
Sod, How to Lay Properly ... 958
Soil Builder, Kudzu Plant as, by C. E. Pleas ... 909
Soil Crusher Made from Mower Wheels ... 486
Soil Hardening in Irrigated Land Makes Cultivation Difficult ... 432
Soil Pressure Measured Accurately by Machine ... 577
Soil Surveys, Auto Speedometer Changed to Make ... 874
Soldering Bit, Glass Cutting with ... 453
Soldering Bit Heater, Gas Iron as ... 322
Soldering Blowpipe Made from Incadescent Gas Lamp ... 958
Soldering Copper, Universal ... 617
Soldering Flux Containers ... 800
Soldering Flux, Powdered Resin as ... 632
Soldering Holes in Tanks ... 473
Soldering Iron and Blowtorch Combined ... 935
Soldering Iron, Self Heating, without Valve or Pump ... 857
Soldering, Jewelry ... 134
Soldier, Blind, Writes Prize Winning Book ... 487
Soldier—Hero Honors, Unknown, Electrical Achievements Signalize, by John W. Kean ... 19
Soldier—Hero, Unknown, Story of ... 17
Soldiers in Verdun, Gold Medal Commemorates ... 326
Soldiers, Irish Division, Tower to Commemorate ... 186
Soldier Memorial Trees Protected by Signs ... 268
Soldiers Service Banner Memorial in Geneseo, Ill. ... 668
Soles, Raw Rubber, Used on English Sport Shoes ... 90
Song Setting, Best, Prize Offered for ... 651
Soot Remover, Cheap ... 313
Sorghum Sirup Manufactured by Improved Method ... 192
Sound Box, Auxiliary, on Phonograph Tone Amplifier ... 553
Sound Box, Phonographic, Perforated Disk ... 918
Sounds Measure Feeble Electric Currents, by C. A. Briggs ... 488
Souvenirs, 100 Tons of Rails Made into ... 175
Spade, Clay Digging, Pneumatic ... 257
Spark Plug, Carbon Proof, Manufactured in France ... 446
Spark Plug Tester, Rare Element as ... 118
Spark Plugs, Model Gas Engine, How to Make ... 812
Spectacles, Attachment for, Aids Marksmen ... 469
Speed Limiting Device, Fluctuating Load Engines should Have ... 793
Speeder, Gasoline, for Combating Forest Fires ... 566
Speedometer, Auto, Changed to Make Soil Surveys ... 874
Speedometer Shaft Aids in Cleaning Furnace ... 304
Spinach Pickers Use Boats on Large Chinese Marshes ... 678
Spindle Straightening Fixture ... 786

Spines, Best Human, Prizes Offered for..... 980
Spirits Revealed to be Nothing but Chiffon.. 693
Sponging Wood before Staining..... 454
Spool Toy, Eccentric..... 308
Spoon and Fork Combination Tongs..... 766
Spoon, Chemical Crusher Made from..... 470
Spotlight and Control, Auto, for Closed or Open Cars 279
Spots, Removing from Varnished Surfaces.. 814
Spout, Down, Auto Exhaust Cleans..... 145
Spray Gun, Cement, Rock Bursts in Metal Mines Experimentally Prevented with.... 415
Sprayer, Potato Plant, How to Make..... 795
Spring, at Home of President Andrew Jackson 927
Spring Cover, Pliant Metal, for Autos..... 933
Spring, Cutting After Winding..... 943
Spring Hanger Bolts, Auto, Jack for Replacing 484
Spring Prevents Breaking of Fishline..... 485
Spring, Punch, Rubber Stopper Used as..... 972
Spring Spreader and Tire Remover Combined 484
Springs, Auto Transmission, Tool for Clamping 287
Springs, Drilling Tempered..... 459
Springs, Flat, Fixture for Forming..... 130
Springs, Straightening Heavy..... 625
Sprinkler and Sweeper, Street, Three Wheeled 550
Sprinkler, Bobsled Snow, Makes Roads Icy for Logging 430
Sprinkler, Golf Course, Rubber Rollers on.. 716
Sprinkler Heads, Protecting..... 292
Sprinkler, Homemade Lawn..... 968
Sprinkler Nozzle, Lawn, Has Fan-Shaped Spray 122
Sprinkler, Shower, on Bathing Beach..... 435
Sprockets, Silent Chain, as Belt Pulleys.... 782
Sprouter, Oat, Incubator Used as..... 146
Square, Center Punch Attachment for..... 943
Square Made from Scales..... 137
Square, Rod Attachment Useful on..... 294
Squirrel, Pet, Rides Phonograph as Merry-Go-Round 444
Stability Demonstrator, Airplane..... 328
Stability Tests, Airplane, to Make Flying Safe 52
Stacking Machine, Hay, Saves Time and Labor 71
Staff Brake, High Power, for Freight and Passenger Cars 736
Stage Scenery, Reversible, for Outdoor Theater, by John Anson Ford..... 95
Stage Scenes, Berlin, Rapid Method of Changing 910
Staining, Sponging Wood before..... 454
Stains on Leather Removed by Solution of Rubber 906
Stains, Removing from Concrete..... 125
Stairs Made Safe for Baby..... 470
Stairs, Skid for Use on..... 941
Stamps, Rubber, for Floor Layouts..... 777
Stand, Flowerpot, Guard for..... 151
Stand for Painting Auto Hoods..... 615
Stand, Sewing, Easily Made..... 314
Stand, Sewing, Trench Helmet as..... 148
Stand, Umbrella, Trench Helmet as..... 147
Standpipe, Concrete, Unusual Artistic..... 64
Staple, Hardened Hasp, Prevents Sawing.... 142
Star Map, Luminous, Aids Amateur Astronomers 101
State Line on Meridian Trail, Granite Arch Marks 247
State Line Sign between Texas and New Mexico 599
Station Piers, Railroad, Epoch Making Tests of, by Henry S. White..... 23
Statue, Lifelike, Japanese Wood Carver Cuts 312
Statue, Massasoit, Given Plymouth, Mass., by Redmen 324
Statue of Famous Horse Cast in Bronze.... 101
Statues, Decorative, in Molded Concrete.... 722
Steam Boiler Compound Feeder..... 142
Steam Boiler, Electric, Economically Operated 594
Steam Boiler, Small Electrically Heated.... 975
Steam Boilers, Average Coal Consumption in 780
Steam Coils Dispose of Canadian Engine Terminal Snow 191
Steam Engine, Twin Cylinder Oscillating, How to Make..... 639
Steam Engine Valves, Slapping, Curing.... 460
Steam Hammer, Inverted, Drives Piling Upward 560
Steam, Heating Water with..... 449
Steam Machine, Electric, for Removing Wallpaper 903
Steam Mains, Sags and Pockets in..... 631
Steam Motorcycle Economical to Operate... 204
Steam Operated Ax for Chopping Redwood. 906
Steam Radiator Valve Humidifies the Air... 113
Steam Shovel, Gasoline Engine Shovel Displaces 832
Steam Touring Car Similar to Gasoline Car. 693
Steam Tractor Grates Made from Old Tires. 124
Steam Tractor, Lightweight..... 377
Steam Tractor, Powerful, Has Two Engines. 857
Steam Whistle, Huge, in Kansas City..... 598
Steamboat, Old Mississippi, as Power Plant. 406
Steamer "All-America" Has Up-to-Date Equipment 4
Steamers, Passenger, Portable Altars Installed on 716
Steel Car Wheels Made in Revolving Mold. 26
Steel, Hollow, Sand Blast Process for Making 238
Steel Interests, The, by H. H. Windsor..... 27
Steel Parts, Automatic Electric Furnace for Treating 694
Steel, Pittsburgh, Carried to Cincinnati on Barges 208
Steel, Rustless Plastic, Made in England.... 266
Steel, Shafting, Tested to Find Stress Limit 213
Steel Wool, Smokers' Pipe Strainer Made of 402
Steel, Working Heated..... 453
Steeplejack Climbs Chimney with Aid of Box Kite 214
Steeplejack Marooned on Smokestack..... 162
Steering Wheel Muff for Autoists..... 158
Stencils, Decorating, Roller for..... 286
Stencils Made from Old Films..... 450
Steps, Skid for Use on..... 941
Stereoscopic Views, Simple Camera Attachment for 865
Stereotype Matrices, Making from Type Forms 453
Sterilizer, Electric, for Razors..... 564
Sterilizer, Toothbrush, Keeps Brush Sanitary 440
Stewpan, Efficient 156
Stick Hydrometer for Antifreeze Solution in Auto Radiators 126
Stick, Walking, Kiddie Scooter Convertible into 120
Stickers to Identify Rush Orders..... 449
Still Explosion, Oil Refinery..... 252
Stills Captured in Raids Destroyed by Army Tanks 727
Stock Boxes, Steel, Rack for..... 792
Stock, Die, Takes Round Dies of Different Diameters 106
Stock Drawers, Safeguarding Price Marks on 614
Stock Exchange Reports Sent by Wireless Telephone 372
Stock Support, Adjustable..... 789
Stock Tie, Automatic..... 468
Stone Bags, Flood Protection, Trees Grow from 872
Stone Boat, Improved..... 285
Stone Conveyor, Unloads and Piles for Storage 196
Stones—Boulders Give Forth Music..... 110
Stool, Milking, Sanitary Aluminum..... 366
Stop, Adjustable Bench..... 460
Stop, Automatic, for Tumbling Barrel..... 450
Stop for Taper Reamers..... 618
Stop, Flue Hole, Is Fireproof and Invisible. 917
Stop, Simple Gate..... 647
Stopper, Rubber, Used as Punch Spring.... 972
Storage Batteries, Electrically Heated Knife for Repairing 826
Storage Batteries, Repairing..... 814
Storage Batteries, Testing Height of Electrolyte in 321
Storage Battery Post, Broken, Repair for.. 473
Storage Battery Service Station Aid..... 139
Storage Eggs, Preventing Disagreeable Flavor of 88
Storage House, Ventilated, for Apples..... 938
Store, Cigar, Has Humidor Compartments for Customers 166
Store, Department, Self-Government Practiced by 933

Store, Los Angeles, Dutch Windmill Model for 85
Store, Paris Jewelry, Hotel being Built over 89
Stories, Scenario, Prizes for..... 323
Stories, True Outdoor, Prizes for..... 323
Storm, Columbia River "Silver Thaw," by H. E. Thomas..... 216
Storm, Electric, Kills Wild Geese..... 75
Storm Windows Made from Shutters..... 155
Stove Ash Pan Has Screen Bottom..... 115
Stove Burner, Adjustable Height, Reduces Gas Consumption 498
Stove Business, Prosperous, from Salvage, by Charles A. Goddard..... 83
Stove, Electric, for Roasting..... 602
Stove, Electric, Has Switch with Two Pilot Lamps 45
Stove, Gas, Has Novel Burner and Cast Iron Range Top 588
Stove, Oil-Burning Coal..... 151
Stove, Outdoor, Broken Drain Tile Makes.. 145
Stove Wicks, Oil, Flannel as Emergency... 479
Stovepipe Cap, Simple..... 318
Stovepipe Cap, Trench Helmet as..... 148
Stovepipe Soot Remover, Cheap..... 313
Straightening Fixture for Spindles..... 786
Strainer, Smokers' Pipe, Made of Steel Wool 402
Strainers, Well, Porous Concrete Casings as 226
Strap, Adjustable Machine..... 630
Straw Hook for Pulling from Stack..... 486
Straw, Louisiana Rice, Used for Making Paper 544
Stream and Road Share Mountain Tunnel... 99
Street Car Fare, Double, Ingenious System Solves 441
Street Car Stops, Detroit Trolley Poles Painted at 927
Street Car Terminal at Presidio, San Francisco 269
Street Car Window Wiper, Mechanical, Aids Motorman 764
Street Cars, Haitian, Built from American Autos 727
Street Cars, Little Rock, Ark., Have Gum Vending Machines 108
Street Cars, Motor Busses on Rails Replace 855
Street Cars, War Tanks Converted into.... 51
Street Crossing Markers, White Cement Blocks for 885
Street Digging Tool, Asphalt, on Work Car. 96
Street Drain and Manhole in Combination Inlet 859
Street Obstruction Signal for Day or Night Use 584
Street Paving, Brick, Serves Well During Long Period 750
Street Repair Work, Winter, Old Asphalt Used for 232
Street Sweeper and Sprinkler, Three-Wheeled 550
Street Traffic Director Cannot be Knocked Down 279
Street Washer, London's Midnight..... 860
Street Widened to Relieve Congestion in Cincinnati 205
Streets, Berlin, 100,000 Volts Carried Over.. 98
Streets, City, Simple Location System for.. 271
Streets, Paris, Red "Safety Bands" Protect Pedestrians in 89
Streets, Traffic Signs Painted on, in Oakland, Calif. 599
Stress Limit Tests for Shafting Steel..... 213
Stretcher, Print Drying..... 145
Stretching Leather Lagging on Pulleys.... 294
Strikes, Cost of, by H. H. Windsor..... 189
Stripping, Flexible Weather, Uses Cotton Wicking 605
Strop, Razor, for Campers..... 804
Stud Setting and Drilling Machines for Propellers 234
Students Offered University Scholarship for Good Road Essays..... 815
Studio, Large Glass, Delicate Operation of Moving 561
Stuffing Box, Repairing Worn..... 627
Stump Cutter, Rapid Power Driven..... 203
Stump Puller Raises Sunken Donkey Engine 239
Stump Removing Machine Leaves Only Chips 879
Stunt, Spectacular Jumping, Ends in Death. 904
Submarine Hulls, German, Converted into Tankships 855
Submarine Power Plant to Give 10,000 Mile Radius 102
Submarine, Sunken, Raising..... 194
Substation, Automatic, in Coal Mine..... 264
Suburban Train Passengers, Late Parisian, Given Slips of Arrival Upon Request..... 344
Subway Entrances, "Nickel First" Turnstiles for 213
Subway Extensions in London, Eng..... 279
Suction Ejector, Combined, for Pumping Out Cellars 521
Suction Pumps Empty Auto Gas Tanks before Shipping 78
Sugar, Artichoke as Possible Source of.... 202
Sugar Cane Harvesting Machine, by Robert Grimshaw 494
Sugar Cane, the Modern Way of Growing, by H. H. Windsor..... 187
Sugar Cane, the Pioneer Way of Growing, by H. H. Windsor..... 187
Suggestions, Municipal Management, Prizes for 324
Suits — Uniforms, Messengers, Company Cleans and Repairs..... 117
Sulphur, Huge Mass of, Mountain in Pacific Ocean Is 184
Sulphur Removed from Coke with Hydrogen Gas 583
Sunspots Consist of Gases Cooled by Expansion 414
Supercharging Compressor for Airplane Engines 386
Support, Adjustable Stock..... 789
Supporters, Hose, Adhesive Tape as..... 642
Surgery—Operation Completed by Doctor with Use of Flashlights..... 923
Surgery, Tree, Certain Features of, Patented 940
Survey, Hydrographic, Checked by Aerial Maps 733
Survey, Photographic, of Great Lakes—St. Lawrence Waterway Made by Canadian Air Board 536
Surveying Device, New French, Make Preliminary Surveys Easy..... 758
Surveying Parties Use Airplanes and Airships 90
Surveying Test Drill Holes, Interesting Process of 912
Surveys, Soil, Auto Speedometer Changed to Make 874
Sweat, Gas Main, Collecting from Drip Wells 897
Sweating of Concrete Walls, Preventing... 941
Swedging Tool, Bearing Bushings Renewed with 938
Sweeper and Sprinkler, Street, Three-Wheeled 550
Sweeping Compound Distributor..... 650
Sweeping, Corners Painted to Insure..... 293
Sweet Corn, Planting..... 954
Sweet Potato Grows through Padlock..... 121
Swimmer, Long Distance, Shark-Proof Net Protects 717
Swimming Support Made in Animal Form.. 879
Swimming under Water..... 972
Swing, Airplane, How to Make..... 959
Swing and Hammock, Porch, Adjustable Position 767
Swing as Exerciser Has Support for Feet.. 549
Swing, Folding Baby..... 931
Switch, Change Over, Simple Wireless..... 411
Switch, Electric, for Household Uses..... 930
Switch, Electric Range, Has Two Pilot Lamps 45
Switch, Indicating, for Electric Iron..... 305
Switch, Knife, Guard Plate for..... 943
Switch, Light, and Grinder Combined..... 453
Switch, Simple Dimming..... 484
Switches, Knife, Mounted in Safe Position.. 616

Table and Bed in One for Small Apartments 185
Table and Chairs, White Enamel, for Children 445
Table, Auto Serving, Stands on Running Board 858
Table, Collapsible Porcelain Top, Can be Folded into Small Space..... 115
Table Drawer, Drawing, Novel Arrangement of 134
Table, Kitchen, Contains Two Washtubs and Washboards 114
Table, Knockdown, for Breakfast or Ironing 439
Table Lamp, Japanese..... 144
Table Leaves, Storing Extra..... 645

Table, Ornamental Porcelain, Folds Against Wall 273
Table Top, Inlaid, Made of Thousands of Pieces of Wood 915
Table Top, Ornamental, Made of Steel Tubing 715
Table, "U," Disarmament Conference at 18
Tablet, Bronze, in Memory of Author of "Old Siwash" Stories 598
Tackle, Airplane Arresting, for Use on Ships 508
Tag Case, Numerically Holding 130
Tag Holder, Price, How to Make 805
Tail Lamp, Auto, Made of Heavy Construction 918
Tailstock Handle, Lathe, Lever for 948
Talcum Powder Makes Playing Cards Slick. 157
Talking Pictures Made with Aid of Radio.. 859
Tallying Machine Used in Handling Freight 496
Tank Cars, Glass Lined, for Transporting Milk 6
Tank Cars, Inside Pressure of, Greater When Standing 500
Tank Cars, Oil, Unloading Rack Quickly Empties 44
Tank, Colossal Gas, Holds 15,000,000 Cubic Feet 32
Tank, Concrete Water, Unusual Artistic 64
Tank, Fuel Measuring, for Consumption Tests of Engines 270
Tank Heater, Gas Water, Electrical Control for 381
Tank, Old, Stovepipe Heater Made from 321
Tank, Water, Raising 25 Feet 949
Tanker, Oil, Single Deck Ship Converted into 56
Tanks, Acetylene, Locating Leaks in 141
Tanks, Auto Gas, Emptied by Suction Pumps before Shipping 78
Tanks, Auto Gas, Self Acting Filling Cap for 600
Tanks, Crystal Palace Tower, Preserving from Rust 904
Tanks, Soldering Holes in 473
Tanks, Steel, of Few Plates More Durable.. 431
Tanks, War, Converted into Street Cars 51
Tanks, War, Destroy Stills Captured in Raids 727
Tankships, German U-Boat Hulls Converted into 355
Tap and Drill Chuck, Safety, Protects Tools. 748
Tap and Reamer Milling Fixture 296
Tap Holder, Novel, for Drilling Machine 955
Tap Wrench Aids Breast Drill 132
Tap Wrench, Double 140
Tape, Adhesive, as Hose Supporters 642
Tape Measure Attachment Makes Measuring Easy 606
Tape Measure, Pocket Knife Contains 931
Tape, Raised Letter, Machine Makes for Blind Typists 173
Taper Turning Gauge 627
Tapered Work, Laying Out 794
Tapestry, Wonderful, France Prepares for America 690
Tapping Holes in Thin Tubing 782
Taps Used to Remove Bushings 293
Tar in Gas, Amount of, Rapid Method of Determining 686
Tar Sand Tested for Road Base Material ... 493
Tax Computing Machine Has Chart for Any Tax Rate 863
Tax, The Sales, by H. H. Windsor 28, 188
Taxes, A Few Pay the, by H. H. Windsor 846
Taxes—Federal Aid, Stop, by H. H. Windsor 28
Taxes, Our War, by H. H. Windsor 27
Tea Container Also Measures 603
Teakettle, Electric, Has Two Compartments 746
Teapot Lid Holder Also Prevents Spout Dripping 602
Tear Gas, Police to Use as Emergency Measure 515
Tees, Clamp for Welding and Brazing 777
Tees, Golfing, Gun for Making 116
Teeth, Metal Cutting Saw, Special Wheel Cleans 554
Telegraph Cables, Old, Used to Build Foot Bridge 63
Telegraph Circuit, Duplex, Superimposed on Australian Trunk Telephone 841
Telegraph Messenger's Uniforms Cleaned and Pressed by Company 117
Telegraph, Portable Wireless, Set Up in Flores Island 870
Telegraph, Simple Printing, Prints on Tape. 440
Telephone Amplifiers to Give Flood Warnings, by H. A. Lane 9
Telephone Applicants, Tokyo, Required to Wait 15 Years before Granted Privilege .. 548
Telephone, Australian Trunk, Duplex Telegraph Circuit Superimposed on 841
Telephone Balloon Messages, Wireless, Sent Successfully 230
Telephone Booth, Communication with Ship from 742
Telephone Cable Contains 2,424 Wires 499
Telephone Cable, New, Laid Cross Irish Channel 829
Telephone, Church Bell Demonstrated Over. 716
Telephone Concert, Wireless, Heard by Movie Audience 100
Telephone Customers, Prospective Wireless, Listen While They Shop 916
Telephone Device, Wireless, Four Sets of Headphones on 834
Telephone, Explosions in Mines Caused by .. 570
Telephone Fire Call Adopted by Canadian Communities 391
Telephone Garter, Wireless, for Radio Fans 710
Telephone Holder Fits Top of Coin Box 492
Telephone Industry, Amount of Lead Used in 893
Telephone Memo Pad Needs No Pencil 605
Telephone Message, New York Radio, Heard by Ship 1,000 Miles Off San Francisco 748
Telephone Meter, Home, Counts Calls 585
Telephone Poles, House Built of 542
Telephone Receiver, Short-Wave Wireless, How to Make 963
Telephone Receiver, Wireless, Using Several Phones on 813
Telephone Repair Truck with Novel Features 68
Telephone Service Measured Like Electric Light 833
Telephone Service Station Planned, Commercial Wireless 580
Telephone Slug Holder, Handy 273
Telephone Wire, Total Length of 110
Telephone, Wireless, Bootblack Stand Equipped with 859
Telephone, Wireless, Broadcasting Over Light Wires 831
Telephone, Wireless, Broadcasting the 231
Telephone, Wireless, Built in Form of Phonograph 753
Telephone, Wireless, How to Make 475
Telephone, Wireless, in Chicago School 936
Telephone, Wireless, Installed on Electric Train 352
Telephone, Wireless, Installed on Railroad Trains 842
Telephone, Wireless, Market and Weather Conditions by 382
Telephone, Wireless, Mystifies Chinese 442
Telephone, Wireless, Political Candidates Do Electioneering by 72
Telephone, Wireless, Progress of, by H. H. Windsor 187
Telephone, Wireless, Special Phonograph Sends Concerts by 848
Telephone, Wireless, Stock Exchange Reports Sent by 372
Telephone, Wireless, Talking Pictures Made with Aid of 859
Telephone, Wireless, to Aid Crime Detection 489
Telephone, Wireless, Tufts College to Give Lectures Via 887
Telephone, Wireless, Used to Trace Lost Shipments 343
Telephones that Tell no Tales, by G. H. Dacy 524
Telephones, Wireless, Apartment Houses to be Wired for 738
Telescope, Long Idle, Now Put to Use 354
Telltale, Automatic, Shows Engine Direction 282
Telltale, Ingenious, on Tubular Rivet Machine 353
Tellurium May Raise Gasoline Efficiency 504
Temperance Study in Schools Encouraged by Prize Essay Contest 980
Temperature Cooling with Vacuum Cleaner. 970
Temperature Measuring Instrument Has Self-Compensation 46
Temperatures, High, Quartz Crystals Furnish Standard for, by C. A. Briggs 324
Temperatures, Ice Cream, New Apparatus for Taking 566
Temple, Mormon, Designed on Straight Lines 333
Tennis Court on Roof of Water Reservoir .. 233
Tennis Courts, Cement, Laid with Permanent Lines 388

Tennis Playing on "Pogo Sticks" 332
Tent, Army Pup, Improving and Waterproofing 644
Tent Frame, Rigid Collapsible, for Campers 604
Tent, Lightweight Kitchen, for Tourists.... 334
Tent Peg, Improved..... 970
Terminal, Chicago Mail, Equipped to Handle Big Tonnage 744
Terminal, Municipal River, Erected at Nashville 737
Terminal Scraper, Battery..... 287
Terminal Snow, Canadian Engine, Disposed of by Steam Coils..... 191
Terminal, Street Car, at Presidio, San Francisco 269
Terminal Warehouse System in Minneapolis 65
Terminals, Battery, Preventing Corrosion of 648
Terminals, Wire, Made from Eyelets..... 805
Tester, Auto Ignition..... 288
Tester, Spark Plug, Neon Utilized as..... 118
Testing Base for Magnetos and Generators. 950
Testing Device Weighs Galvanized Coatings 235
Testing Instruments, Oil, for Auto Engines. 365
Testing Motors, Generators, and Transformers, Part I—Motors..... 289
Testing Motors, Generators and Transformers, Part II—Generators and Transformers 456
Testing Rack, Automobile Road, for Garage 73
Testing Real and Artificial Silk..... 797
Testing Unit, Portable Electric..... 781
Testing Wool or Silk Goods..... 811
Theater Constructed in Three Sections..... 565
Theater, Knickerbocker, Wrecked by Collapse of Roof..... 587
Theater Office Building Has Three First Floors 107
Theater, Outdoor, Reversible Scenery for, by John Anson Ford..... 95
Theater Patrons, Movie, Flashlight for Seating 559
Theater Roof, Washington, Causes of Failure of 699
Theater Society Offers Prize for Local and Present Day Life Plays..... 979
Theater Stage Scenes, Berlin, Rapid Method of Changing 910
Theaters, Seven Washington, Closed by Investigation 548
Theory, Einstein, Moving Pictures to Illustrate 892
Theory of Relativity to be Further Tested.. 588
Thermoelectric Pyrometer Has Self-Compensation 46
Thermometer and Radiator Cap Locking Device 193
Thermometer Holder, Bed, Handy and Sanitary 725
Thermometer—Humidity Readings at a Distance, Instrument Gives..... 116
Thermometer, Medical, Easy to Bring Mercury Down 272
Thermometer Mercury Replaced by Cheaper Liquid 232
Thief Trapped by Powder Coated Coins.... 413
Thomas, H. E.:
Columbia River Highway Icebound..... 216
Settlement, Abandoned, Reclaimed by Wells 197
Thread Gauge, Holder for Protecting..... 952
Thresher and Bailer Combined Saves Time and Money 732
Thresher Belt Wound by Power..... 791
Thresher, Combined Harvester, Motor to Operate 774
Thresher, Combined Header, Proves Economical 597
Thresher, Wheat Cleaning Machine for Use with 689
Threshing Machine, Giant, Built from Seven Others 381
Throttle Lever, Locomotive, with New Safety Catch 590
Thumbtacks, Countersunk, for Drawing Board 629
Ties, Railroad, Weather Map Used to Save Money When Placing..... 696
Tile, Antislip Floor, Prevents Accidents.... 568
Tile, Broken Drain, as Outdoor Stove..... 145
Tile Ditcher, Horse Drawn..... 913
Tile, Drain, Artistic Lamps Made from..... 486
Tile, How to Drill..... 139
Tile, Large, Making Smooth Joints in..... 466
Tilting Tests Show Safety of Motor Busses 392
Timber Experiment Station Established in South 32
Ticket Selling Device, Railway, Dates, Clips, and Registers the Amount..... 360
Tide, Alaskan, Baseball Game Called on Account of 552
Tide Barriers, Seaweed Collected by..... 90
Tide, Rise and Fall of, Permits Natural Drydock 529
Tides Responsible for Present Life Forms, by C. A. Briggs..... 324
Tie Changing Machine, Rapid Economical.. 695
Tie Press Removes Wrinkles Over Night... 273
Ties, Railroad, Perforating Machine for.... 51
Timber Forests, Alaskan National, Have Huge Wealth 94
Timber Preservative, Copper Sulphate Water Is 860
Timber—Shingle Bolts, Automatic Aerial Conveyor for 860
Time Signals, Wireless, Received at Elgin.. 550
Timer, Automobile, Has Only Two Wires... 871
Tinning, Cold, of Metals..... 614
Tinning Small Work..... 124
Tipple, Coal Mine, Serves Two Mines through Long Conveyor..... 267
Tire and Disk Wheel Lock..... 74
Tire and Tool Locker in Rear of Auto Body 194
Tire Chains, Compartment for..... 650
Tire Chains, Emergency 813
Tire Gauge Also Contains Valve Tools..... 134
Tire Pump and Radiator Fan Combination. 166
Tire Pump, Revolving Cylinder..... 383
Tire Remover and Auto Spring Spreader Combined 484
Tire Repairs, Pneumatic, Adjustable Mold Simplifies 85
Tire Rim Contractor and Jack Combined... 911
Tire Rims, Demountable, Holder for..... 804
Tire Rope, Automobile, Replaces Chains.... 891
Tire, Spare, Brackets for..... 469
Tire Tubes, Extra Inner, Metal Box Protects 119
Tire Tubes, Old, Dolls and Animal Toys Made of 164
Tire Valve Caps, Dust-Proof Rubber..... 367
Tire Wrapping Paper Made Water, Dust, and Vermin-Proof 118
Tires, Auto, Corrugated Rubber Tubes for. 869
Tires, Auto, Threadless Dust Cap for..... 768
Tires, Fully Inflated, on Auto Submerged Six Months 366
Tires, Identification Marking on..... 318
Tires, New, Preventing Theft of..... 470
Tires, Old, Engine Grates Made from..... 124
Tires, Pneumatic, Modernize Old Jinrikisha 378
Tires, Removing Stiff..... 629
Tires, Rubber, for Wooden Wheels..... 643
Tires, Rubber, New Form of Scale Weighs. 732
Tires, Worn Out Auto, Fence Made of..... 901
Tissue Paper as Moth Preventive..... 798
Toaster and Heater Combined, Electric.... 439
Tobacco Testing, Automatic Pipe Smoker for 432
Toboggan, Motor, for Snow Covered Roads. 731
Toilet Cabinet for Bathroom..... 931
Tokens of Friendship, Neat Container for Sending 868
Toll Bridge, New Viaduct Replaces..... 656
Tomato Canning Wastes, Experimental Purification of 928
Tone Producer for Violins..... 328
Tongs, Combination Fork and Spoon..... 766
Tool and Tire Locker in Rear of Auto Body 194
Tool Handle or Pin Vise, Simple..... 626
Tool, Handy Combination..... 783
Tool Shed Carried Across River by Aerial Cableway 493
Toolholder, Novel 298
Tools, Quick Change Set of, Have Detachable Bits 920
Tooth, Ulcerated, Lioness Treated for..... 52
Toothbrush Bottle, Sanitary..... 115
Toothbrush, New, Cleans all Surface of the Teeth 731
Toothbrush Sterilizer Keeps Brush Sanitary 440
Toothpaste Tube Holder, Improved..... 402
Torch Cuts Cast Iron in 50 Feet of Water, by A. M. Hoffmann..... 682
Torch, Cutting, Produces Ornamental Ironwork 787

Torch, Electric, Successful in Underwater Cutting 745
Torch, Natural Gas, Is Economical..... 601
Torch, Soldering, Made from Incandescent Gas Lamp 958
Torch, Welding, Metal Rose Tree Made with 378
Torch, Wrecked Ship Hulk Imitated with.. 380
Torches, Gas Control Regulator for Operation of 118
Torpedo, Railroad Track, Appeals to Sight, Smell, and Hearing..... 171
Totem Poles, Indian "Copyright Law" Concerning, by Francis Dickie..... 898
Touring, Auto, Elaborate House for..... 160
Touring Berths, Automobile, Adds to Comfort 75
Touring Truck, Taffy Making and Movies on 425
Tourists, Auto, Bungalette Camp for, by John Anson Ford..... 416
Tourists, Auto, Garage and Apartment for.. 918
Tourists' Camping Cabins at Fergus Falls, Minnesota 109
Tourists' Comfort Station, Auto, at Mason City, Iowa 598
Tourists, Lightweight Kitchen Tent for.... 334
Tourists Patronize Yosemite Park Cafeteria 261
Tow Rope, Steel Knot, for Autos and Trucks 610
Tower, Ornamental Bronze, for Memorial Chapel 78
Tower Tanks, Crystal Palace, Preserving from Rust 904
Tower Tests Waterproofing Material for Concrete 913
Tower to Commemorate Famous Irish Division 186
Towers, Improved Traffic, for Detroit..... 44
Towers, Saracen Water, in Palermo..... 570
Towers, Wireless, World's Largest..... 3
Towing Tongue, Auto, Steers Automatically 739
Toys:
  Automobile Made of Ball Bearings..... 533
  Balloons, Gas Filled, Declared Fire Menace 683
  Boat, Spring Propelled..... 646
  Canoe on Wheels for Kiddies..... 937
  Dog that Barks like Real..... 121
  Doll House Furniture, Lead, How to Make 809
  Doll that Cries Audibly and Sheds Real Tears 546
  Doll that Kicks Its Feet and Waves Its Hands When Buggy Moves..... 608
  Dolls and Animals Made of Inner Tubes. 164
  Eccentric Spool 308
  Frog, Jumping, How to Make..... 485
  Kiddie Car Teaches Baby to Walk..... 281
  Kiddie Car with Sidecar..... 280
  Kiddie Horse, How to Make..... 968
  Locomotive, Coal-Burning, 20 Inches Long 536
  Sail Boat Model Made of Paper..... 279
  Scooter, Kiddie, Convertible into Walking Stick 120
  Shamrock Snake Game..... 121
  Shooting Gallery 445
  Sled Propelled by Handle..... 773
  Slingshot Made of Aluminum..... 937
  Table and Chairs, White Enamel, for Children 445
  Tractor, Small Powerful, Pulls Heavy Load 772
  Velocipede Quickly Changed to Wagon... 281
  Wagon Coaster Brake, Easily Renewed.. 650
  Water Plane, How to Make..... 808
  Worm Gears, How to Make..... 480
Tracings, Drafting, Keeping Trace of..... 302
Tracings, Inking in Temporary Details on. 302
Track, Morocco Railroad, Changed to Normal Gauge 366
Track Torpedo Appeals to Sight, Smell, and Hearing 171
Track Treads, Tractor, Give Greater Pulling Power 916
Track, Wire Covered, for Truck in Logging Industry 817
Tracks, Prehistoric Animal, Found in Kentucky 738
Tractor and Auto Make Pioneering Easy... 715
Tractor Attachment Is Plow and Weed Killer 417
Tractor, Circular Saw on, for Clearing Land 576
Tractor, Endless Tread, as Snowplow..... 393
Tractor Engine, Miniature, Carries Large Load 772
Tractor, Farm, Has Three Wheel Drive.... 76
Tractor, French, Simple and Original..... 401
Tractor, Hillside Leveling Attachment on... 334
Tractor, Lightweight Steam 377
Tractor, Powerful Steam, Has Two Engines. 857
Tractor Pulls Motorboat Over Snow Covered Highway 697
Tractor Pulls Two Road Graders Abreast... 371
Tractor, Road, as Hoist to Raise Sand from Beach 551
Tractor Road Grader, Simple and Economical 413
Tractor, Rotary Snowplow for Roads Driven by 500
Tractor Route, Sixty Mile Beach as..... 896
Tractor Salesman, Movies in Home of Farmer Act as..... 493
Tractor, Small, Performs Double Service.... 721
Tractor, Small, Usable for Various Purposes 685
Tractor Snowplow, Combined, for City Streets 915
Tractor Started with Carbide..... 288
Tractor Track Treads Give Greater Pulling Power 916
Tractor Trailer, Heavy Duty, Has Removable Body 256
Tractor Tread Automobile for Travel Over Snow 749
Tractor Used for Various Farm Duties.... 944
Tractor, Walking, for Use on Plowed Soil... 350
Tractors, Farm, Drive Plant Made Powerless by Drought..... 584
Tractor, Five, Reduce Farming to Single Operation 901
Trade, Export, Plan to Aid, Abandoned by Sponsors 573
Trade, Geese Stimulate, between England and Poland 25
Traffic Control, New York, from One Center 431
Traffic Director Cannot be Damaged or Knocked Down 279
Traffic Officer Carried on Ship's Bowsprit.... 46
Traffic "Safety Bands" in Paris Streets..... 89
Traffic Safety Zone Sign in Springfield, Ill.. 435
Traffic Signs Painted Across Street in Oakland, Calif. 599
Traffic System, American, British Columbia Adopts 413
Traffic Towers, Improved, for Detroit..... 44
Traffic Whistles for Blind in Denver, Colo.. 758
Trailer and Crane Combination Handle Disabled Autos 753
Trailer, Auto, for Transporting Horses..... 43
Trailer for Bicycle..... 811
Trailer, Heavy Duty Tractor, Has Removable Body 256
Trailer, Heavy Load, Has Four Wheels on One Axle 226
Train, "Batch Box," Motor Truck Transports 242
Train, Electric, Wireless Installed on..... 352
Train, Elephants Board at Passenger Station 38
Train, Fast Moving, Motion Picture Film Prepared on, by Jack A. Bristol..... 420
Train Passengers, Late Paris Suburban, Given Slips of Arrival Upon Request..... 344
Train, Russian Electric, High Powered..... 675
Train Transports Snow for Skiing..... 363
Training, Animal, Behind the Guard Ropes, by Frank Braden..... 705
Training Station and Air Craft Base, North Island, Calif. to be..... 353
Trains, Freight or Passenger, Electric Signal for 36
Trains, Russian, Distributes Radical Literature 237
Transferring Printed Pictures 308
Transferring Prints to Glass..... 155
Transformer, Generator, and Motor Testing, Part I—Motors 289
Transformer, Generator, and Motor Testing, Part II—Generators and Transformers... 456
Transformer, Million Volt, for Laboratory.. 497
Transformer, Radio Oscillation 150
Transformer, Semaphore on, Signals Overload 508
Transmission Line, Long, on Pacific Coast Nearing Completion 567
Transmission Line to Span Straits of Messina 728
Transmission Springs, Auto, Tool for Clamping 287

Transmission Wires, Cañon Walls Serve as Poles for 820
Transplanting Receptacle for Young Trees. 415
Transplanting Tool for Plants..... 808
Transportation Motor Busses, Highway by A. H. Lane..... 176
Transporter, Suspended, Carries Traffic Across English River..... 60
Transrectiformer Changes Low-Voltage Alternating Current to High-Voltage Direct Current, by H. A. Lane..... 821
Trap, Humane Steel, Holds Animal in Net. 583
Trap, Mouse, Connected to Auto Horn Prevents Theft 473
Trap, New Style, Rats Caught and Drowned in 736
Trap, New Type Gopher, Makes Record Catch 206
Trap, Paper Fly, Is Sanitary and Ornamental 862
Trap, Shooting Rat, as Burglar Alarm..... 482
Trapping Rodents without Bait..... 977
Travelers, Rubber Washbowl for..... 690
Traveling Bag Has Compartment with Toilet Articles 766
Traveling Women, Lone, Ribbon Protects.. 681
Tray, Adjustable Desk 42
Tray, Feeding, for Birds..... 811
Tray, Improvised Developing 977
Tray, Incubator Egg, Turns all Eggs at Once 714
Tray, New Desk, Is Wind Proof and Convenient 242
Treads, Tractor Track, Give Greater Pulling Power 916
Treatments, Heat, Electric Apparatus for Giving 520
Treaty, Four Power, Nineteen Signatures to 189
Tree Culture, Pecan, to be Tried in China.. 896
Tree—Elm, Historic, Saved by Concrete Filling 593
Tree Felling Saw, Motor Driven..... 508
Tree, Historic Pine, 1,200 Years Old..... 914
Tree, Metal Rose, Made with Welding Torch 378
Tree Planting for Coal Mine Props..... 418
Tree Planting Year, Banner, 1922 to be.... 324
Tree Surgery Patented, Certain Features of 940
Tree Surgery with Portable Electric Drill Outfit 419
Tree, Tropical, Bears Fruit in Northern Back Yard 544
Trees Along Boulevard Protected by Signs. 269
Trees, Big, Moved Economically..... 135
Trees, Decayed, How to Save 283
Trees, Fruit and Shade, Combined..... 646
Trees, Fruit, Protected from Frost..... 812
Trees Grow from Stone Bags Used as Flood Protection 872
Trees, Myrtle, Grown for Commercial Purposes 426
Trees Protected from Insects..... 805
Trees, Rain Proof Joint for, that Grow through Roof of House..... 546
Trees, Sod Cutting Around 974
Trees, Soldiers' Memorial, Protected by Signs 268
Trees, Young, Holder for Transplanting..... 415
Trellis, Indoor Fern, Made of Chain..... 978
Trench Cutter, Gasoline, for Highways..... 703
Trench Helmets, Utilizing Steel..... 147
Trestle or Anvil, Convenient, Made from Steel Rail 622
Trestles, Concrete, to Cross Soutnern River Swamps 98
Triangle, Draftsman's, Eyelets for..... 142
Triangle, Slot in, for Trimming Drawings.. 953
Tribute, Fitting, Paid American Legion Post 46
Trick Can, Bootlegger's, for Swindling Customers 903
Trick Candle and Flag, Magic..... 156
Trick, Chess, Knight's Tour..... 648
Trick Letter 145
Trick—Pill Box, Magic..... 315
Trick—X-Ray Pack of Cards..... 485
Tricks, Magicians', to be Respected..... 651
Trimming Drawings with a Knife..... 953
Trip, Coast to Coast, Made by Boy and Dog on Horseback 280
Triplane, Armored, Carries Cannon and Six Machine Guns 816
Trolley Poles, Detroit, Painted Aluminum at Stop Corners 927
Trophy for Airplane Efficiency..... 323
Trophy, Good Roads, Auto Club Awards.... 487
Trouble Lamp, Auto, Mounted on Clothespin 970
Trouble Lamp, Shade for..... 317
Trough, Rubber, for Acid Carboys..... 141
Troughs, Eave, Repairing with Cement..... 976
Trouser Hanger Holds Garment from Inside 767
Trout Landing Net, Pocket 182
Trout Roller Sieve Sorts into Sizes..... 900
Trowel for Concrete Road Work..... 459
Truck, Automatic Dumping..... 261
Truck, Charcoal as Fuel for Gas Producer on 576
Truck, Coffee, Fire Department Operates.. 66
Truck, Cultivator, and Ladder Cart, Wheelbarrow Convertible into..... 525
Truck, Delivery, Motorcycle Improvised as 957
Truck, Elevating Platform, with Gasoline Motor 882
Truck, Motor, Elevating End Gate Attached to 877
Truck, Motor, Moves Two Story Office Building 717
Truck, Motor, Transports "Batch Box" Train 242
Truck, New, Handles Aggregates Efficiently 107
Truck Railroad, Motor, on Hetch Hetchy Line 419
Truck Ratchet Crank, Lumber, Facilitates Unloading 758
Truck, Repair, Transports Men and Material 249
Truck, Runaway, Demolishes Army Barracks 885
Truck, Six Wheel Drive, Pulls Highway Train 745
Truck, Six Wheeled Logging, Wire Covered Track for..... 817
Truck System, Warehouse, Developed in Minneapolis 65
Truck, Telephone Repair, with Novel Features 68
Truck, Touring, Taffy Making and Movies on 425
Truck, Two Purpose Factory, Has 4 Lifting Legs 929
Truck, Two Tank Mop, for Cleaning Floors 567
Trucks, Armored, for Transporting Mail in Cities 514
Trucks, Covered, Haul Five Auto Bodies... 713
Trucks, Glass Lined Tank, for Transporting Milk 6
Trucks Loaded too High to Pass Door Warned by Bell..... 270
Truing Device, Electric, for Lathe Work... 224
Truing Diamonds, Wheel, Care of..... 776
Truss Rod, Auto Radiator, Is Cheap and Easy Repair 433
Trusses for Stiffening Long Ladder..... 466
Tube, Electric Valve, Made with Reversible Feature 47
Tube, Immense Creosoting, Makes Freak Shipment **674**
Tube, Inner, as Motorists' Water Pail..... 144
Tube, Inner, as Shade for Trouble Lamp... 317
Tube, Inner, as Trough for Acid Carboys... 141
Tube Support Keeps Hose from Kinking.. 439
Tubes, Corrugated Rubber, for Auto Tires. 869
Tubes, Extra Inner, Metal Box Protects.... 119
Tubes, Inner, Aid Corn Shucking Workers.. 636
Tubes, Inner, as Tires for Wooden Wheels. 643
Tubes, Inner, Dolls and Animal Toys Made of 164
Tubes, Inner, Rubber Mat Made from..... 649
Tubes, Old Inner, Exercising Machine Made from 306
Tubes, Paper Shipping, for Rugs..... 905
Tubes, Punctured Inner, Cotter Pin Aids in Deflating 305
Tubing Cap, Gas, Fits Any Size Hose Connection 363
Tubing, Frame for Building Made of..... 422
Tubing, Steel, Ornamental Table Top Made of 715
Tubing, Thin, Tapping Holes in..... 782
Tug of War, Auto and Airplane Tie in..... 236
Tumbler Covers Open by Pressure in Center 439
Tumbling Barrel, Automatic Stop for..... 450
Tunnel Bore, Enlarged without Stopping Traffic 586
Tunnel Digging Machine Also Lines Walls.. 4
Tunnel, Mediterranean—Dead Sea, to Restore Holy Land, by Lewis R. Freeman... 849

Tunnel, Mountain, Road and Stream Share. 99
Tunnel, Proposed, through Continental Divide, by Geo. F. Paul..... 331
Tunnel, Test, for Solving Ventilation Problems, by S. R. Winters..... 199
Turbine Locomotive for Swiss Railway.... 183
Turbine Plant, Gigantic, Designed for Germany 884
Turbine Pumps, High Speed, on Auto Makes Effective Fire Engine..... 677
Turbine Type Grinder, Small, Has High Speed 249
Turkey, President's, Shipped in Battleship Crate 414
Turkey Yoke Prevents Straying..... 144
Turning, Novelty Wood..... 146
Turning Tool, Crankshaft..... 451
Turnstiles, "Nickel First," for Subway Entrances 213
Turntable Pit, Wild Locomotive Plunges into 697
Tying and Sealing Machine, Package, by Robert H. Moulton..... 532
Type Cases for Holding Small Parts..... 952
Type Forms, Making Stereotype Matrices from 453
Typesetting Machine, Practice Chart of Keyboard on 700
Typewriter Attachment to Assist Blind..... 15
Typewriter, Blind and Deaf Cripple Operates 673
Typewriter Ribbon Substitute..... 157
Typewriter Ribbons, Restoring 969
Typewriter Student Aided by "Flashboard" Machine 696
Typewriting Students, Touch, Keyboard Shield Aids 235
Typewriting to the Bottom of Sheets..... 149
Typists, Blind, Machine Makes Raised Letter Copy for 173

"U" Table, Disarmament Conference at.... 18
Ukulele Peg, Metal, Fits All Types..... 436
Umbrella Ribs as Welding Rods..... 294
Umbrella Stand Made from Trench Helmet.. 147
Unemployed Men, Great Woodyard Gives Work to 569
Uniforms, Messenger's, Company Cleans and Repairs 117
Union Station Foundation Tests, Astonishing Results of, by Henry S. White..... 653
Universal Joints, Auto, Tool for Inserting.. 133
University Scholarship Offered for Good Road Essays 815
Unknown Hero Honors, Electrical Achievements Signalize, by John W. Kean..... 19
Unknown Hero, Story of..... 17
Unloading Rack Quickly Empties Oil Tank Cars 44
Unreeling Machine, Silk, Invented by Italian 520

Vaccination of Chickens for Protection Against Chicken Pox..... 338
Vacuum Brush, Electric, for Dusting..... 115
Vacuum Cabinet, Sanitary, for Preserving Food 549
Vacuum Cleaner Used to Cool Temperature of Room 970
Vacuum Tube Amplifier Aids Partially Deaf 704
Valve Attachment, Radiator, for Steam Heated Rooms 525
Valve, Automatic Ball, of Extreme Simplicity 881
Valve, Ball Check, Made from Screw..... 617
Valve Balls, Check, Lifting..... 459
Valve Caps, Tire, Dust Proof Rubber..... 367
Valve, Float, for Gas Engine Hopper..... 638
Valve Grinder Made from Hand Drill..... 140
Valve Refacing Lathe, High Efficient..... 117
Valve, Safety Relief, of Improved Design.. 442
Valve Seat Reamer, Improved..... 613
Valve Seats, Ball Check, Grinding..... 301
Valve, Steam Radiator, Humidifies the Air. 113
Valve Tools Combined in Tire Gauge..... 134
Valve Tube, Electric, Made with Reversible Feature 47
Valves, Inaccessible, Magnet Used for Removing 295
Valves, Model Gas Engine, How to Make... 812
Valves, Old, as Plugs in Testing Auto Radiators 298
Valves, Overhead, Rocker Lever for..... 158
Valves, Overhead, Rocker Lever for Patented 781
Valves, Slapping Exhaust, Curing..... 460
Valves, Using Old Engine..... 150
Vane, Sailor Wind..... 473
Vanity Pillow Contains "Make Up" Necessities 931
Varnished Surfaces, Spots Removed from.. 814
Vases and Drain Tile, Artistic Lamps Made from 486
Vases, Rustic Flower, How to Make..... 977
Vault, Burial, Tested as Water Craft..... 62
Vault Floors Lowered and Raised by Motors 186
Vaults, Building Safety Deposit, by T. Benjamin Faucett 376
Vegetable and Fruit Press, Rotary..... 931
Vegetable Slicer Can be Clamped to Table.. 115
Vegetable—Sweet Potato Grows through Padlock 121
Vehicle—Jinrikisha Modernized with Pneumatic Tires 378
Velocipede Quickly Changed to Wagon..... 281
Vending Machine Has Miniature Pistol Range 923
Vending Machine, Gum, in Little Rock, Ark., Street Cars 108
Venetian Red, Best Color for Outside Woodwork 134
Ventilation for Machinery Increases Efficiency 868
Ventilation Necessary for Farm Implements 643
Ventilation Problems Solved in Test Tunnel, by S. R. Winters..... 199
Ventilator Cowl, Improved, Preserves Ships' Cargoes 366
Venturi Gas Meter, Largest Ever Built..... 669
Venus, Atmosphere of Planet, Contains No Oxygen 714
Veterinary Capsules for Small Parts..... 785
Viaduct, New, Replaces Toll Bridge..... 656
Vibration Testing in Buildings..... 460
Village, Ancient, Excavations of, by R. P. Crawford 537
Village of Plymouth, Modeled by School Pupils 936, 937
Village, Remote Workers', Has Modern Conveniences 593
Vineyard Cultivator, Motor, Operated by One Man 724
Violin Family, Six New Instruments Added to 492
Violin Made of Matches, Toothpicks, and Glue 695
Violin, Muting a..... 479
Violin of Different Woods for High and Low Tones 340
Violin Player, Group Control..... 260
Violin Playing with Artificial Arm..... 241
Violins, Tone Producer for..... 328
Vise, Hacksaw, Adjustable Block for..... 953
Vise, Holding Round Stock in..... 618
Vise, Old, Arbor Press Made from..... 465
Vise, Pin, or Tool Handle, Simple..... 626
Vise Used for Truing Small Commutators.. 295
Vises, Adjustable Planer 462
Vitamines Unnecessary for Plant Growth.. 44
Vulcanizer, Electric 400
Vulcanizer, Electric Iron as..... 306
Vulcanizing Mold, Adjustable, Simplifies Pneumatic Tire Repairs..... 85
Vulcanizing without a Vulcanizer..... 132

Waffle Baker, Electric, Easy to Clean..... 602
Wagon Brake, Mountain Type..... 482
Wagon Coaster Brake Easily Renewed..... 650
Wagon Loader Works on Soft Ground..... 92
Wagon Wheel, Gate Arbor Made from..... 645
Walker, Fred S.: Grain Raising on a Lake Bottom 395
Walking Machine Boat for Water..... 222
Wall Blow-Out, Reservoir, Tears Huge Gap. 590
Wall, Concrete, Adds to Warmth of House.. 806
Wall, Fool-Proof Sea, Has Sharp Edged Top 47
Wallboard Edges, Beveling 464
Wallpaper, Electric Steam Machine for Removing 903
Wallpaper Machine Holds Paste and Paper. 680
Walls, Canon, Serve as Poles for Transmission Wires 820
Walls, Concrete, Preventing Sweating of... 941

Walls, Concrete Wharf, Cost Little More Than Timber 588
Walls, Old, Hints on Painting 785
Walls, Porous, Size for 461
Walrus Ivory Carvers of Bering Sea, by G. Dallas Hanna 761
War Bill, Our, by H. H. Windsor 27
War Department, Records of Power Resources Kept by 198
War Invention, Workman Awarded Medal for 487
War Memorial in Kansas City, Mo., Dedication of 268
War Memorial, Service Banner, in Geneseo, Ill. 668
War Slackers, Few Real, in List of Draft Evaders 85
War Surplus Materials for Roads, States Get 4
War Veteran, Blind, Writes Prize Winning Book 487
Wardrobe, Moth and Dust Proof, Rubber Tubing Makes 248
Warehouse System, Terminal, in Minneapolis 65
Warehouses, Fireproof Cotton, Models Show 892
Warmer, Electric, Prevents Auto Radiator Water from Freezing 578
Warships to be Converted into Breakwater 768
Warships, U. S. Navy, Scrapping, by H. G. Layton 835
Washboiler, Grain Scoop Made from 469
Washbowl, Portable Rubber, for Travelers. 690
Washer, Electric Bottle and Glass 36
Washer, Improved Blueprint 460
Washer, Milking Machine, Rapid Sanitary.. 730
Washer Pump, Electric, for Emptying Water 931
Washer, Sanitary Dish 931
Washer, Street, London's Midnight 860
Washers, Improvised, for Garden Hose Connections 977
Washing Bucket, Auto, Saves Soap and Varnish 765
Washing Machine, Electric, Also Has Electric Light 930
Washing Machine Handle, Emergency 805
Washing Machine, Trench Helmet 149
Washtubs, Two, Contained in Kitchen Table 114
Watch Carrier for Auto Made of Wire 932
Watch Charm, Land Elevations of Nation Shown in 696
Watch, Desk, Home Savings Bank Combined in 890
Watch Dial, Standard and Summer Time Shown on 798
Watch Fobs, Metal, Making 648
Watch, Large, Has Many Complicated Dials 238
Watch, Largest, Exhibited at Washington.. 545
Water Aerating Apparatus for Bathtub 60
Water, Alkaline, Made Drinkable 307
Water, Boiler Feed, should be Preheated... 627
Water, Copper Sulphate, Is Timber Preservative 860
Water, Distasteful, Caused by Harmless Organisms 410
Water Filter, Bottle Washer, and Drinking Fountain Contained in Faucet Attachment 115
Water Filter, Feed, How to Make 785
Water Filters, Oordinary Cistern, Do Not Purify 38
Water, Gas Main, Collected from Drip Wells 897
Water Gauge Glasses, Cleaning 306
Water, Getting from Low Wells 644
Water Golf Is Latest Fad for Pleasure Seekers 742
Water, Gravelly Soil in California Used for Storing 920
Water Heater, Electric 356
Water Heater, Gas, Upper Floor Control for 314
Water Heating with Steam 449
Water Height, Phonograph Mechanism Tells 54
Water in Gasoline, Test for 315, 482
Water Jacket, Cracked Engine, Repairing.. 624
Water Main, Cut by Torch in 50 Feet of Water, by A. M. Hoffmann 682
Water, Oxygen Removed from to Prevent Pipe Rusting 744
Water Pail, Motorists' Inner Tube as 144
Water Pipe Aid, Battery Service Station... 139
Water Plane, Toy 808
Water Power Development in Arkansas, by Tom Shiras 574
Water Power Development in Netherlands Indies 546
Water Power Development in Southwestern States 370
Water Power Development to Restore Holy Land, by Lewis R. Freeman 849
Water Power Expansion in Ohio River Basin 336
Water Power Model for Installation of Power Plant, by Sam E. Conner 275
Water Power Plant, Huge Canadian, Completed at Niagara 326
Water Power Station, New Electric, in Valencia, Spain 848
Water Reservoir, Roofed-in, Provides Tennis Courts 233
Water Reservoir, 25,000,000,000 Gallon, for New York 224
Water Standpipe, Concrete, Unusual Artistic 64
Water Supply and Irrigation Projects in Canada 680
Water Tank Heater, Gas, Electrical Control for 381
Water Tank, Raising 25 Feet 949
Water Towers, Saracen, in Palermo 570
Water Walking Machine Crosses San Francisco Bay 222
Water, 100 Per Cent Pure, Sign Advertises. 434
Watercycle, Life Saving, Folds into Small Space 827
Waterproofing Material, Concrete, Tower Tests 913
Waterproofing Rope Clotheslines 151
Waterway, Great Lakes — St. Lawrence, Canadian Air Board Makes Photographic Survey of 536
Waterworks Dam, Absolute Control of River with 701
Wattle Wood and Bark to be Made into Wrapping Paper 842
Wave Motor Utilizes Waves for Power 928
Wax Applier, Sealing, Electric 100
Wax, Paraffin, Prolongs Life of Emery Belts 946
Weather and Market Conditions by Wireless Telephone 382
Weather Bureau Service Saves Lives and Property 326
Weather Chart Used to Save Money When Placing Ties 696
Weather Maps, Three Dimension, for Airmen 441
Weather Observer Employed by London Power Company 549
Weather Outpost, Norway's, Island Wireless Station Is 185
Weather Stripping, Flexible, Uses Cotton Wicking 605
Weather Vane, Sailor 473
Weatherproofing Bridge Construction, Bronze for 194
Weaving Loom, Felt, Is Largest Ever Constructed 728
Wedge Holds Door for Planing 292
Weed and Insect Exterminating Machine... 423
Weed Growth, Mulching Paper Prevents.... 830
Weed Killer and Plow Attachment for Tractors 417
Weed—Seaweed Collected by Tide Barriers. 90
Weeding Seat, Garden, Prevents Backaches. 6
Weight, Paper, Also Contains Writing Desk Set 439
Weight Testing Device for Galvanized Coatings 235
Weights, American Made, Improved Accuracy of 194
Weird, Model Herring, Made by Maine Fisherman 403
Welder, Electric, Uses Alternating Current. 679
Welding and Brazing Clamp for Tees 777
Welding Machine, Arc, Uses Alternating Current 848
Welding Outfit, Arc, Has Novel Current Control 74
Welding Outfit on Motorcycle 39
Welding Rods, Umbrella Ribs as 294
Welding Torch Equipment, Portable 192
Welding Torch, Metal Rose Tree Made with 378
Well—Cistern Filters, Ordinary, Do Not Purify 38

Well, Low, Improvised Bucket for Getting Water from 544
Well, Oil, Is "Gasser" Instead of "Gusher".. 8
Well Pipes, Driving..... 149
Well Strainers, Porous Concrete Casings as 226
Wells, Abandoned Settlement Reclaimed by, by Horace E. Thomas..... 197
Wells, Drip, Collect Gas Main "Sweat" in... 897
Whale Hunting on the Top of the World, by Lawrence Wm. Pedrose..... 167
Whaling Boats, Eskimos', Are American Built 721
Wharf Walls, Concrete, Cost Little More Than Timber 588
Wheat Cleaning Machine for Use with Thresher 689
Wheat Field Fire Fighting in Eastern Washington 658
Wheel Lock, Spare Disk or Wire..... 74
Wheel, Plow, Dust Shield for..... 638
Wheel Truing Diamonds, Care of..... 776
Wheel, Wagon, Gate Arbor Made from..... 645
Wheelbarrow Convertible into Truck, Ladder Cart, or Cultivator 525
Wheelchair, Invalid's, New Conveniences for 436
Wheels, Antiskid, on German Motorcycle... 2
Wheels, Mower, Soil Crusher Made from... 486
Wheels, Polishing, Balancing 787
Wheels, Railroad Car, Made in Revolving Mold 26
Wheels, Wire, Removing Tight Nuts from.. 314
Wheels, Wooden, Rubber Tires for..... 643
Whiskey Can, Bootleggers', for Swindling Customers 903
Whistle, Automobile, Plays Tune Any Pitch 822
Whistle, Huge Steam, in Kansas City..... 598
Whistles, Traffic, for Blind in Denver, Colo. 758
White, Henry S.:
  Foundation Piers, Epoch Making Tests of 23
  Foundation Tests, Union Station, Astonishing Results of..... 653
  Hydroglider Gives Speed and Comfort.... 243
  Plow or Planer, Portable Machine May be 530
Whittling, Skillful, Various Wood Articles Made by 547
Wholesale Buyers Trained Accordingly to Public Taste 119
Wicks, Oilstove, Flannel as Emergency.... 479
Wind Holds Airplane Motionless..... 359
Wind Vane, Sailor..... 473
Wind, 40 Mile, Wrecks Steel Smokestacks.. 102
Winding the Thresher Belt by Power..... 791
Windlass Holds Hay on Truck..... 956
Windmill Generator Stores Electricity for Eleven Days' Use..... 254
Windmill Model, Dutch, for Los Angeles Store 85
Windmill Regulator, Simple..... 136
Window, Basement, Hose Stored in..... 634
Window Box Aids in Filing Band Saws.... 302
Window Catch, Burglar Proof, Locks Sash Any Point 443
Window Display, Circus Parade Carved from Soap as 445
Window Display, Electric Fan as..... 808
Window Lock, Automatic, Holds Sash Any Position 249
Window Radiator, Electric, Prevents Frost. 725
Window Sash, New, for Cleaning Both Sides from Inside 610
Window Washing, Tram System for..... 43
Window Wiper, Mechanical, Aids Street Car Motormen 764
Windows, Center-Pivoted, Screening..... 978
Windows, Frameless, Replace Ship's Circular Porthole 700
Windows, Preventing from Rattling..... 145
Windows, Storm, Made from Shutters..... 155
Windscreen, Streamline, for Motorcycle Sidecar 276
Windshield Cleaner, Auto, Connected to Engine Manifold 934
Windshields on Upper Deck of Motor Bus.. 720
Windsor, H. H.:
  Armistice Day 27
  Association of Commerce, an Enterprising Junior 845
  Conference, The 27
  Days of '76 and Now..... 846
  Dirigibles a Complete Failure..... 519
  Federal Aid, Stop..... 28
  Fertilizer or Flivvers..... 519
  Flight, Trans-Ocean 845
Windsor, H. H.: (Continued)
  Jingoes and the Naval Holiday..... 519
  Jingoes, Setback for..... 27
  Magicians Deserve Protection..... 845
  Mail Service, Improved..... 188
  Mines, Idle, Tell Sad Story..... 29
  Motor Hotels 29
  Oil in Florida..... 187
  Sales Tax, The..... .....28, 188
  Strikes, Cost of..... 189
  Taxes, a Few Pay the..... 846
  War Bill, Our..... 27
  Way, The Modern..... 187
  Way, The Old..... 187
  Wireless, Progress in..... 187
Winter Travel in Northern Quebec, Dogs Used for 59
Winters, S. R.:
  Dam Construction, Mining Methods Applied to 358
  Freight, Poison Gas Chambers Disinfect.. 595
  Ventilation Problems Solved by Test Tunnel 199
Wiper, Mechanical Window, Aids Street Car Motormen 764
Wire Connector, Lineman's, as Bookbinding Clamp 319
Wire Measurements, Electrical, Terms Used in 777
Wire Screen for Cooling Bread and Cake... 766
Wire, Screen, How to Apply..... 798
Wire, Screen, Pulled Taut with Carpet Stretcher 976
Wire Slack Puller, Guy, Replaces Block and Tackle 890
Wire, Telephone, Total Length of..... 110
Wire Terminals Made from Eyelets..... 805
Wire, Unwrapping in the Lathe..... 790
Wire Wheels, Removing Tight Nuts from.. 314
Wireless, Adjustable Bridging Condenser for 319
Wireless Amplifier, Ordinary Receivers Used with 736
Wireless Apparatus to Make Mountain Climbing Safe 818
Wireless B-Battery, Auto Battery Used as.. 808
Wireless Central, International, for Brazil.. 339
Wireless Change Over Switch, Simple..... 411
Wireless Communication with Ship from Telephone Booth 742
Wireless Concert Heard by Movie Audience 100
Wireless Controlled Fog Signals..... 236
Wireless Coupler, Loose, Increasing Efficiency of 637
Wireless Garter Latest Fad for Radio Fans 710
Wireless Generator, Airplane, Driven with Single Blade Propeller..... 865
Wireless Installed on Electric Train..... 352
Wireless Key, High Speed, How to Make.. 814
Wireless Messages, Amateur, Cross Atlantic Ocean 184
Wireless Messages Immune from Being Picked Up 393
Wireless Messages, Moth, Scientist Investigate, by L. D. Lotton..... 711
Wireless Messages Received on Phonograph Records 920
Wireless News Service for Ships Relating to Derelicts, Floating Wreckage, Misplaced Buoys, Mines, Ice, etc..... 59
Wireless Oscillation Transformer 150
Wireless Outfit Combined with Airman's Oxygen Helmet 880
Wireless, Phonograph Musical Program Heard 2,800 Miles by..... 865
Wireless, Political Candidates Do Electioneering by 72
Wireless, Progress in, by H. H. Windsor.... 187
Wireless Receiver Shaped Like Human Ear 105
Wireless Receiver, Using Several Phones on 813
Wireless Receiving Champion, Man from Chile Is 890
Wireless Reproducing Apparatus, New..... 827
Wireless, Snow Bound Cities Reach Outer World by..... 668
Wireless Station, Island Is Norway's Weather Outpost 185
Wireless Telegraph Code Taught with Phonograph Records 590
Wireless Telegraph, Linking English Possessions by 522
Wireless Telegraph, Portable, Set up in Flores Island 870

Wireless Telephone Balloon Messages Sent Successfully 230
Wireless Telephone, Bootblack Stand Equipped with 859
Wireless Telephone Broadcasting Over Light Wires 831
Wireless Telephone, Broadcasting the..... 231
Wireless Telephone Constructed in Form of Phonograph 753
Wireless Telephone Customers, Prospective, Listen While They Shop..... 916
Wireless Telephone Device, Four Sets of Headphones on 834
Wireless Telephone Equipment Installed on Railroad Trains 842
Wireless Telephone, How to Make..... 475
Wireless Telephone in Chicago School..... 936
Wireless Telephone, Market and Weather Conditions by 382
Wireless Telephone Message, New York, Heard by Vessel 1,000 Miles West of San Francisco 748
Wireless Telephone Mystifies Chinese..... 442
Wireless Telephone Receiver, Short-Wave, How to Make..... 963
Wireless Telephone, Special Phonograph Sends Concerts by..... 848
Wireless Telephone Station Planned, Commercial 580
Wireless Telephone, Stock Exchange Reports Sent by..... 372
Wireless Telephone, Talking Pictures Made with Aid of..... 859
Wireless Telephone to Aid Crime Detection 489
Wireless Telephone, Tufts College to Give Lectures Via 887
Wireless Telephones, Apartment Houses to be Wired for..... 738
Wireless Time Signals Received at Elgin... 550
Wireless Towers, World's Largest, at Port Jefferson, L. I..... 3
Wireless Used to Trace Lost Shipments.... 343
Wireless Wave Velocity, Demonstration of. 426
Wireless Waves Guide Airplanes through Night and Fog, by H. A. Lane..... 329
Wires, Light, Wireless Telephone Broadcasting Over 831
Wires, Sleet Covered, Thawed by Short Circuit 344
Wires, Transmission, Cañon Walls Serve as Poles for 820
Wisconsin's Novel Method of Attracting Settlers 878
Women, Lone Traveling, Ribbon Protects.. 681
Women's Peace Plan, Japanese, 300 Feet Long 2
Wood Alcohol, Using..... 140
Wood, Artificial Plastic, Simulates Timber.. 771
Wood Baseball Scene Whittled with Knife. 254
Wood—Bicycle, 30 Year Old, Has Wooden Frame 700
Wood Carver, Japanese, Cuts Lifelike Statue 412
Wood Chains Made by Skillful Whittling... 547
Wood, Community's, Saw Mounted on Auto Cuts 411
Wood Construction, Laminated, Stresses in. 626
Wood Figures Attract Attention to Window 106
Wood Fuel, Efficiency of..... 130
Wood, Hand Carved Clock Made Entirely of 844
Wood, Myrtle, Grown for Commercial Purposes 426
Wood Pattern Fillets, Leather, Making..... 132
Wood Patterns, Finishing 792
Wood Picture Painted with Natural Colored Wood 381
Wood Preservative, Copper Sulphate Water Is 860
Wood Railroad Cars Have Longer Life Than Steel 920
Wood—Redwood, Steam Operated Ax for Chopping 906
Wood Sawing Aided by Dogs..... 297
Wood Silos, Creosoted 784
Wood Sponged before Staining..... 454
Wood Stave Piping Is Fire Resisting..... 70
Wood, Thin, Preventing Nails from Splitting 956
Wood Turning, Novelty 146
Wood, Wattle, to be Made into Wrapping Paper 842
Wood—Yellow Poplar Lumber, Drying..... 972
Woodwork, Outside, Venetian Red Best Color for 134
Woodworking Machine Name, Prize for.... 815
Woodyard, Great, Gives Work to Jobless Men 569
Wool and Silk Goods, Testing..... 811
Wool Made Moth Proof by German Preparation 514
Wool, Raveled Out Knitting, Straightening 483
Wool, Steel, Smokers' Pipe Strainer Made of 402
Workers, Industrial Rehabilitation of, by Wm. A. McGarry..... 33
Worm, Action of Beach, in Accordance with Tide, by C. A. Briggs..... 324
Worm, Boll, Freight Disinfecting Chamber Against, by S. R. Winters..... 595
Worm Gears, Toy, How to Make..... 480
Wrappers, Oiled, on Apples Stop Scald..... 738
Wrapping Paper Made Water, Dust, and Vermin-Proof 118
Wreath, Ice Incased, Sent from Antipodes to England 231
Wreath with Electric Candle Minimize Fire Risk 218
Wrecks:
Airplane, Wrecked, Halts Portuguese Airman 841
Fire Engine, Japanese, Hangs Over Side of Bridge 372
Locomotive Pinned to River Bed by Piling, Salvaging 378
Locomotive Thrown up Side of Hill in Collision 172
Locomotive, Violent Explosion Wrecks... 907
Pier, Amusement, Wrecked by Runaway Barge 555
Ship Hulk, Wrecked, Imitated with Torch 380
Ship, U. S. S. Memphis, Wrecked, Little Affected by Five Years' Storms..... 97
Smokestacks, Steel, Wrecked by 40 Mile Wind 102
Wrench, Adjustable Socket, for Various Size Nuts 752
Wrench, Box and End, Combination..... 792
Wrench, Combination, Fits Eight Sizes of Nuts 607
Wrench, Connecting Rod 785
Wrench, Convenient Ratchet 124
Wrench, Cylinder Base Nut..... 297
Wrench, Cylinder Head Bolt..... 448
Wrench, Double Grip Socket, for Auto Use. 596
Wrench, Double Tap..... 140
Wrench, Fruit Jar, Gives Firm Grip..... 698
Wrench, Tap, Aids Breast Drill..... 132
Wrench, Usable as Clamp or Vise..... 566
Wringer, Bucket Mop..... 114
Wringer, Electric Clothes, with Soft Rubber Rollers 438
Wrist Pin Bushing Jack Prevents Distortion of Pistons 951
Writing, Hand, Improvement in Identification of 72
Writing White on Blueprints..... 793

X-Ray Apparatus, Lead Diaphragm Used with 166
X-Ray Apparatus, Midget, Is Immersed in Oil 30
X-Ray Film, Paper Backed, Introduced in Germany 193
X-Ray Pack of Cards, Trick..... 483
X-Ray Photos Magnified with New Dental Appliance 38
X-Ray Pictures, Flash Timing Arrangement for Making 692
X-Ray, Soft, Form Arcs in Gas Vapors..... 443
X-Ray Tubes Experimentally Operate at 300,000 Volts 198
X-Rays Reveal Atomic Structure of Matter, by Rogers D. Rusk..... 111

Yacht, Ice, Building a, Part II—Spars, Rigging, and Assembling..... 152
Yards, Beautiful, Prizes Offered for..... 487
Yoke, Turkey, Prevents Straying..... 144

Zoning Regulations, Garage, Tested by Application 173
Zoological Garden Prams for Children..... 444
Zoölogy—Animal, Smallest in the World, Capturing, by Leon Augustus Hausman... 69

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 37 JANUARY, 1922 No. 1

Life-Line Gun Fired from Shoulder

GUNS for throwing life lines, used along the seacoast, have all been of the cannon type, but an English concern is now turning out a light line-throwing gun which is portable and can be fired from the shoulder. Though primarily designed for throwing life lines, it can also be used for mooring lines or, on land, for throwing lines to windows in case of fire. The line is contained in a cylinder which is slipped over the gun barrel and held by a catch. A projectile is then attached to the line and dropped into the barrel and a cartridge inserted in the breech chamber. Ready to fire, the total weight is 14¾ lb. The recoil is about the same as that of a shotgun. A plumb-like bob on the rear sight indicates the elevation. At 30° a 1/16-in. line can be thrown 180 yd., or a 3/16-in. line 110 yd. When mounted on a base, the gun gives an even greater range.

The Portable Line-Throwing Gun in Use: No Matter Where It is Needed, It Quickly Meets the Emergency, For It Requires No Permanent Base or Other Preparation. The Box Contains Extra Cylinders of Line, Projectiles, and Cartridges, Complete Equipment for Every Need

ANTISKID WHEELS USED ON GERMAN MOTORCYCLE

As an antiskid arrangement, side wheels are placed on a motorcycle recently displayed at a Berlin auto show.

The Antiskid Motorcycle with a Body Built on It, in the Act of Making a Turn: The Small Wheel to the Right is Seen Touching the Pavement, Thus Preventing a Fall or Skidding

Each side wheel is arranged at such an angle from the body as to prevent the machine from skidding or falling over when turning in either direction. These wheels also support the motorcycle when not in use. A body, similar to that of the ordinary sidecar, is built around the framework of the vehicle, and the driver rides as in a small automobile.

EXTRA BONES MISTAKEN FOR BROKEN ONES

People are like fish in that some of them have more bones than others. There are about half a dozen extra bones which occur in normal wrists and ankles, and several others are found more infrequently. Some of them may be explained by comparative anatomy. For instance, one extra bone that now and then occurs in the wrist is a regular bone in the corresponding part of lower animals right up to the monkey. They serve no useful purpose; they are merely one of nature's distinctions, not one of her blessings. These surplus bones have a curious practical interest. It has just lately become generally realized that some of these extra bones, in X-ray photographs, resemble closely some of the ordinary fractures which result from personal injuries, and unless care is taken, wrong testimony will be given in court in damage suits. Fortunately, when these extra bones are present in one wrist or ankle they are usually in the other also, so that it is possible to identify them by taking X-ray pictures of the undamaged member.

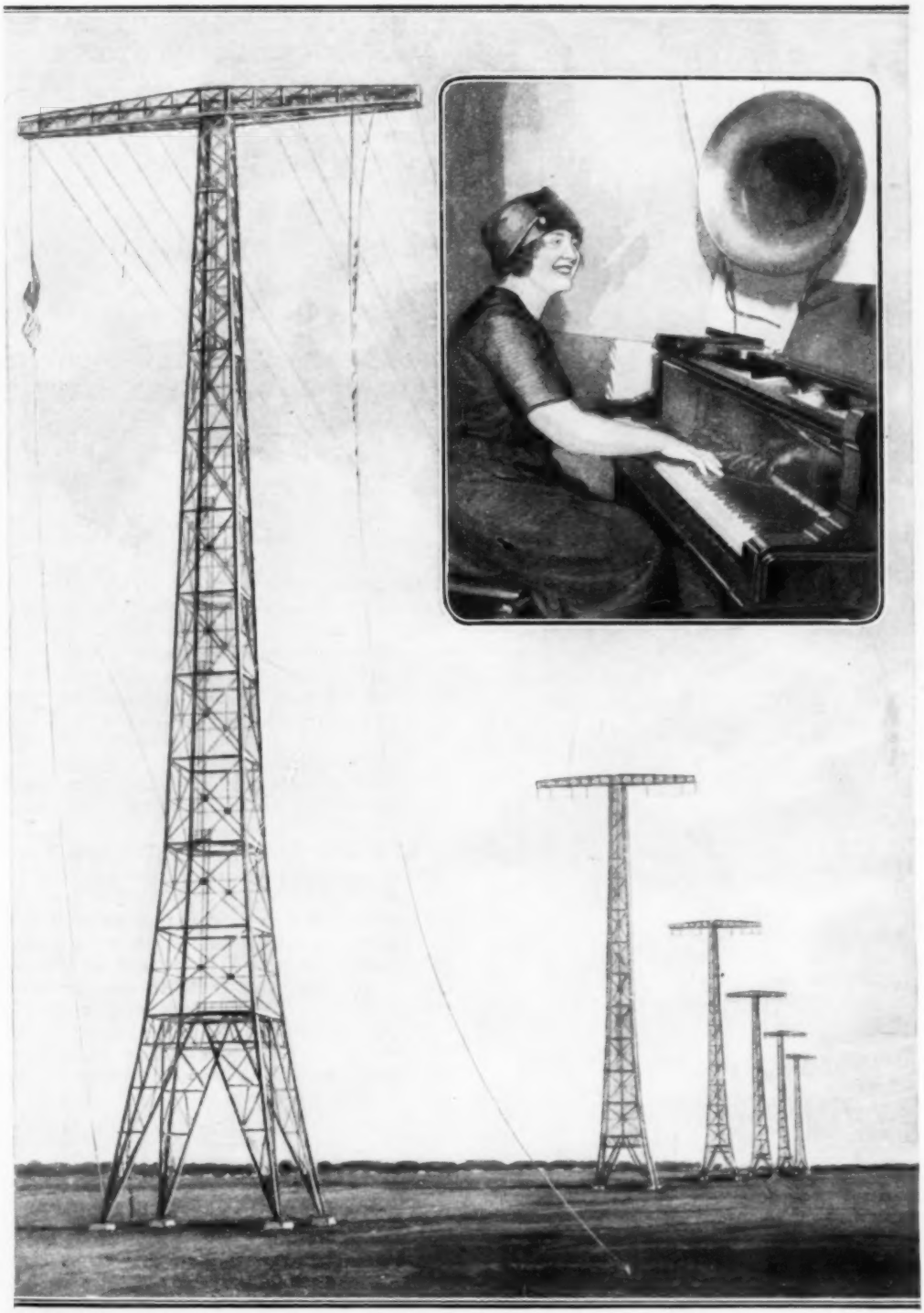
JAPANESE WOMEN'S PEACE PLAN THREE HUNDRED FEET LONG

If length counts for anything, the Japanese women have made a good start toward solving the world-wide problem of how to end all wars. The result of their efforts is a peace plan which is 300 ft. long, and is signed by 10,000 of their number. The document, which is written on rice paper, and has the signatures appearing both in English and Japanese script, was recently presented to the president at Washington, D. C. The committee which brought the interesting document was headed by a woman of 90 years.

WIDE WORLD PHOTOS

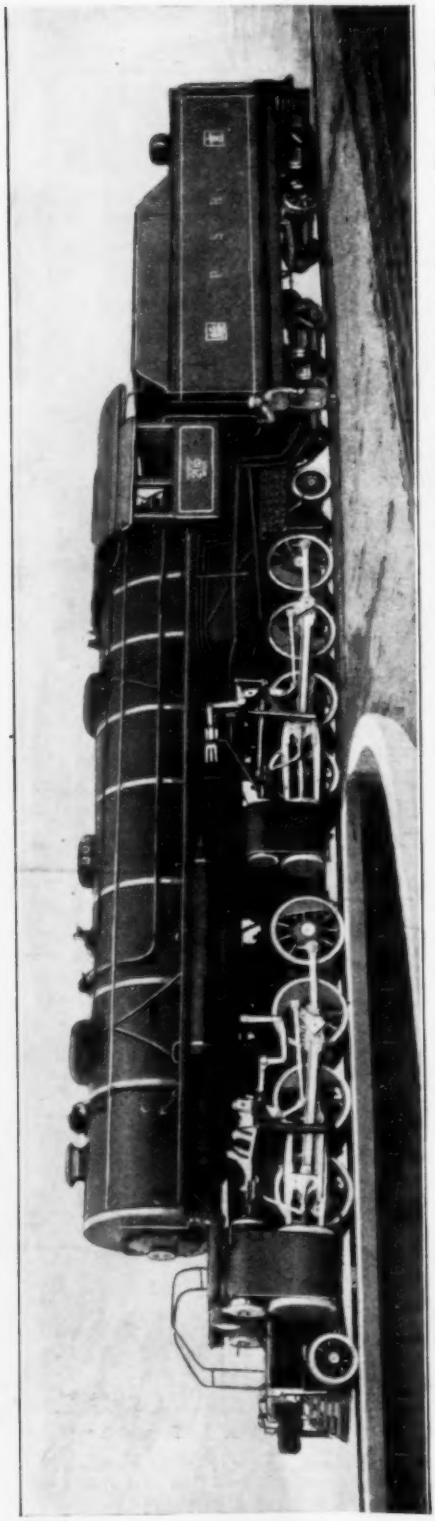
Madame Kaji Yajima Holding the 300-Foot Peace Plan Signed by 10,000 Japanese Women and Presented to President Harding

WIRELESS INCIDENTS AROUSE WORLD INTEREST



SIX of the 72 gigantic towers of the world's largest wireless station at Port Jefferson, L. I., which was formally opened by President Harding on Nov. 5, 1921, are shown here. The station, which was described by this magazine in the September 1920 issue, is operated entirely by remote-control apparatus from New York City—70 miles distant. Insert shows an artist giving a piano recital by wireless, said to be the first of this kind ever given, and estimated to have been heard by 35,000 persons between Maine and Texas.

INSERT COPYRIGHT, UNDERWOOD & UNDERWOOD



Above is Illustrated the First of a Number of Very Large Locomotives Which are being Built by One of the American Manufacturers for Service on Chinese Railways. Hard Service on the Railroads of the United States has Proved That This Is the Highest Type of Motive Power for Heavy Freight Duty. The 16 Wheels Afford Great Tractive Power

CHINESE RAILWAY BUYS LARGE AMERICAN LOCOMOTIVES

What is said to be the largest locomotive in the world outside of the United States has just been shipped to China for service on the Peking-Suiyüan Railway, from the shops of one of the large American manufacturers. The length of this locomotive and tender, over all, is 94 ft. 9 in.; its total weight on track is 320 tons, and it will develop 3,000 hp. This is the first of seven such locomotives to be shipped for use on this Chinese railroad.

CABLE STEAMER "ALL AMERICA" HAS UP-TO-DATE EQUIPMENT

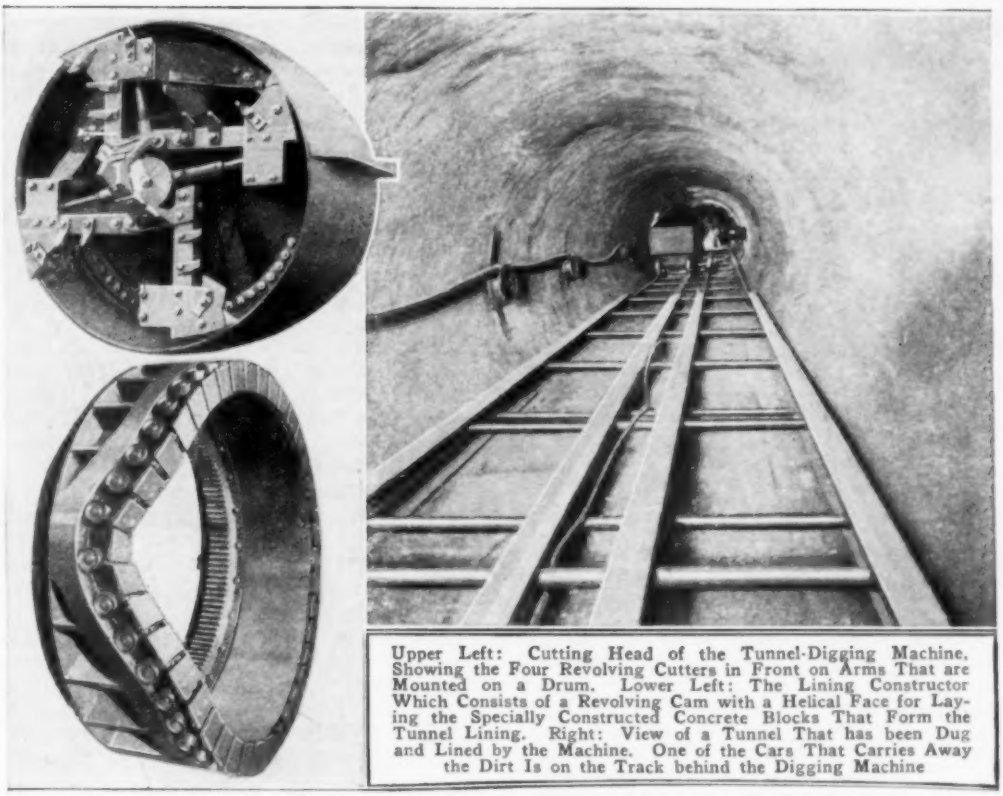
The cable steamer "All America," built on the Tyne in England, arrived recently in New York. Its deadweight tonnage is 1,750, and it is 295 ft. long, 37 ft. wide, and draws 18 ft. There are three cable tanks forward and one aft, all of which have steel cones for coiling. The total capacity is about 14,000 cu. ft. The cable machinery is of the most improved pattern. There is a large testing room on the awning deck. There are workshops with special appliances for doing cable-repair work. The vessel is an oil-burner with two sets of triple-expansion engines. Its equipment includes electric-lighting and refrigerating plants, a wireless installation, a motor lifeboat, etc. Its trial speed was 15¼ miles an hour.

STATES GET SURPLUS WAR MATERIALS FOR ROADS

One hundred and fifty million dollars' worth of surplus war materials have been turned over to the Department of Agriculture by the War Department for distribution to the various states for road-building purposes. This material and equipment include 10,000 tons of TNT, 4,500,000 tons of powder, 25,000 tons of rails, 27,198 motor vehicles, and 172 locomotives.

TUNNEL-DIGGING MACHINE ALSO LINES WALLS

Digging a tunnel, removing the earth, and lining the walls with concrete blocks as the tunneling advances, are all accomplished by a single recently developed machine. The method is claimed to be more rapid, safer, and cheaper than the open-cut or ordinary underground methods. Four revolving arms at the

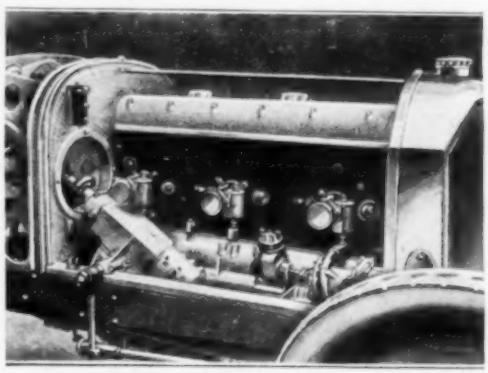


Upper Left: Cutting Head of the Tunnel-Digging Machine, Showing the Four Revolving Cutters in Front on Arms That are Mounted on a Drum. Lower Left: The Lining Constructor Which Consists of a Revolving Cam with a Helical Face for Laying the Specially Constructed Concrete Blocks That Form the Tunnel Lining. Right: View of a Tunnel That has been Dug and Lined by the Machine. One of the Cars That Carries Away the Dirt Is on the Track behind the Digging Machine

front of a cutting head, mounted in a steel drum, carry the cutters which remove the earth. It is deposited, by buckets, on a conveyor belt, which carries it to cars, brought up from the rear. Behind the cutting head are the gearing and mechanism for controlling the direction of the cut. Back of this is the lining constructor, which lays concrete blocks designed so that when they are pushed into place they expand and fit tightly against the earth wall. They are laid in spiral courses, giving a forward motion to the machine, which keeps the cutting head in contact with the tunnel heading. This machine, operated by an electric motor, has constructed 18 ft. 8 in. of finished 52-in. tunnel in four hours.

THREE CARBURETORS ON ENGINE OF FRENCH MANUFACTURE

Three carburetors on one engine presented an odd appearance at a French auto show recently, and was the subject of much comment. The engine is of 40 hp., and has six cylinders. When three carburetors are fitted, two of them supply independent groups of cylinders, for high power and speed, while the third supplies all the cylinders at low speed, or "loafing range," as it is called. Thus, if a motor car has an engine with six cylinders, these are divided into two groups of three, and one carburetor feeds each group when high speed is desired, or when heavy power is needed, as in hill climbing. The third carburetor feeds all of the cylinders at low speed, or at times when the engine is left running while the car is stopped.



The Three Carburetors can be Plainly Seen Mounted on the Side of the Six-Cylinder Engine. These Carburetors Supply Different Groups of Cylinders at Different Speeds

STOOL FOR WEEDING GARDENS TO PREVENT BACKACHES

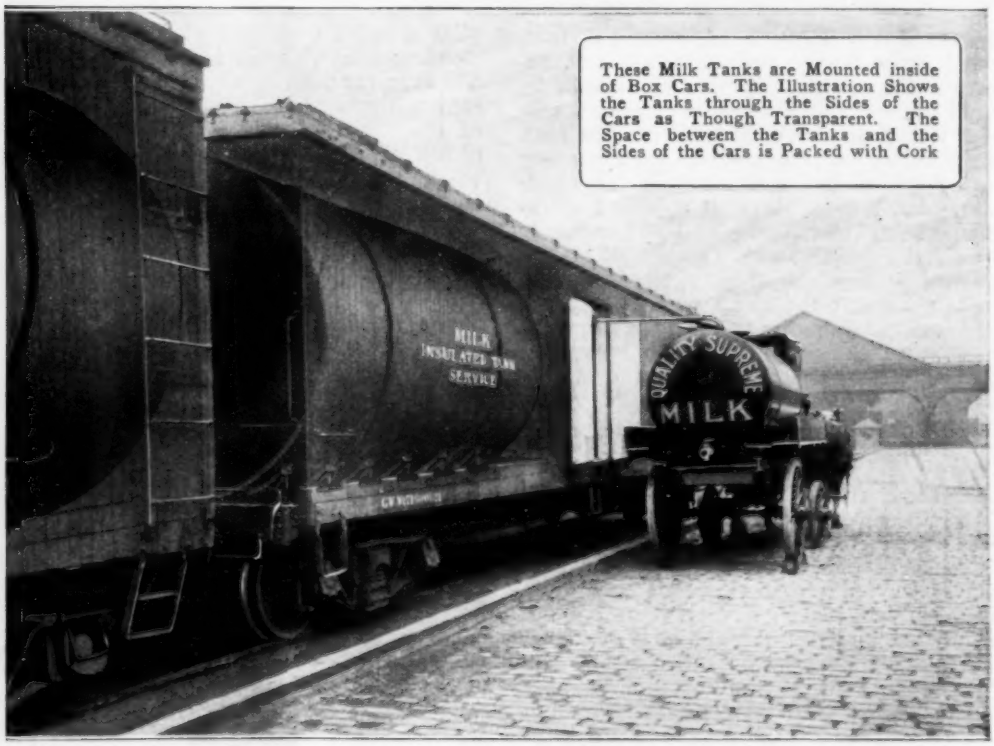
Backaches and sunburn are no longer necessary consequences of weeding the garden. A combination stool and umbrella has been invented to make the gardener's work less of a burden. The seat is mounted on two legs and two wheels so that it may be tilted up and wheeled about like a wheelbarrow. Legs and wheel supports have a telescoping adjustment to obtain exactly the right height, and a lateral adjustment allows the stool to be placed over rows of different widths. A large sunshade is attached to the edge of the seat and may be tilted to just the right angle. With this stool astride the rows, the gardener works in comfort, moving it along as his work progresses.

Seated on a Garden Stool, Weeding Is Less Tiresome, and When the Job is Done, the Umbrella is Taken Down and the Outfit Wheeled Away

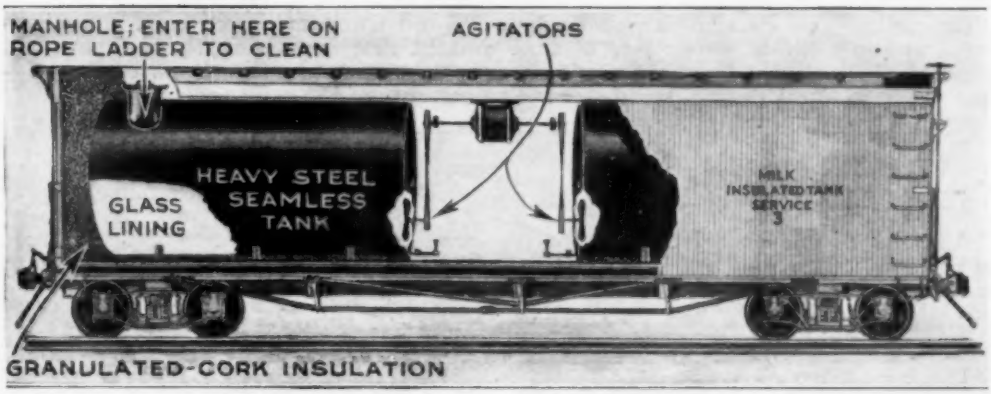
"THERMOS" CARS AND TRUCKS TRANSPORT MILK

Tank cars for oil are a common sight, but tank cars for milk are something distinctly new. The first installation of this kind was made recently for a large dairy in Pittsburgh. Two 2,500-gal. steel tanks are mounted on each car. These tanks are of heavy welded plate steel with a glass lining, and are insulated with cork. Fused into the metal at extreme heat, the glass forms a smooth surface which is easily cleaned and will stand severe usage. Inside each tank is a motor-driven agitator. Run for five minutes before emptying the tank, it gives uniformity to the contents.

Milk, chilled to a temperature of 38 to 40°, is maintained at that temperature in the tanks without further refrigeration. In a 106-mile run, during the hot weather, milk has remained in these cars for eight hours with a change of only 2°



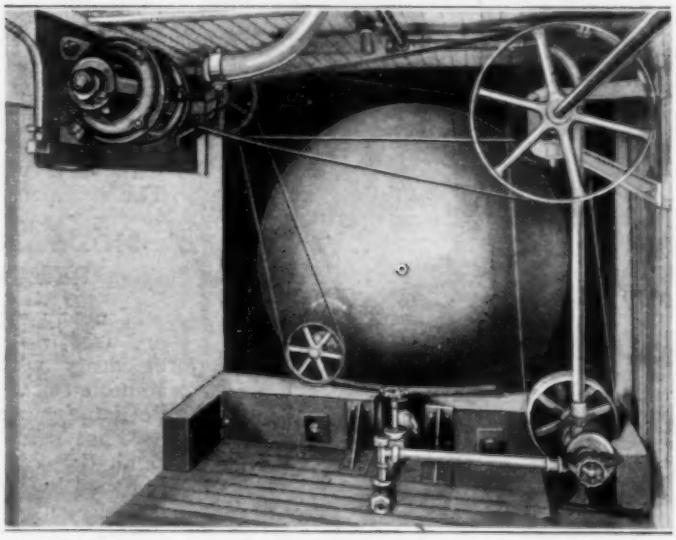
These Milk Tanks are Mounted inside of Box Cars. The Illustration Shows the Tanks through the Sides of the Cars as Though Transparent. The Space between the Tanks and the Sides of the Cars is Packed with Cork



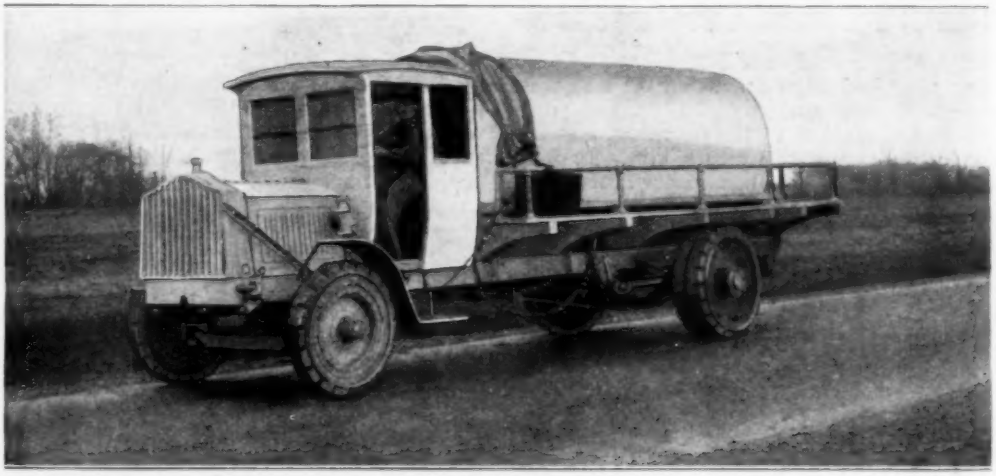
Construction of the Milk-Tank Cars, Showing the Arrangement of Tanks, Manhole for Cleaning, Agitators and Motor, and Insulation: The Milk is Transferred from These Tanks into Motor Trucks, Also with Glass-Lined Tanks, for Conveyance to the Dairy

in temperature. Perfect drainage in emptying the cars results in a loss of only 2 gal. out of 5,000, through milk clinging to the tank walls. Where cans are used, ¼ pt. clings to each 10-gal. can, a loss of 16 gal. out of 5,000. Similar tanks are mounted on wagons and motor trucks for hauling the milk from the railroad to the dairy or collecting it along country roads.

These tank cars greatly reduce the cost of han-



The Inside of a Car, Showing the End of One Tank, and the Motor and Gears Operating the Agitators for Mixing the Milk and Cream



Glass-Lined Milk Tanks are Also Mounted on Trucks for Collecting Milk along Country Roads or for Long Hauls from the Railroad Tanks. With Horse-Drawn Tanks for Short Hauls, All Requirements are Met

dling milk. The Pittsburgh installation requires only three cars. Seven cars were needed when cans were used. It has done away with the services of a 3½-ton truck and seven men. It is estimated that the saving for one year will be approximately two-thirds of the original cost of the tank cars.

OIL MEN STRIKE "GASSER" INSTEAD OF A "GUSHER"

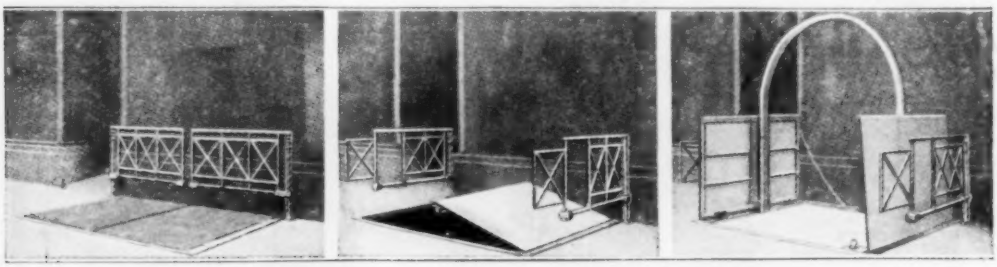
All sorts of unexpected things happen in the production of oil, and one of the most unusual and interesting was the

A Flame of Burning Gas, 400 Feet High, from a Well Which was Drilled for Oil: The Gas was Accidentally Ignited by a Lantern When the Well "Came In"

"gasser" in a field near Long Beach, Calif. This well had been cemented off and was expected momentarily to "come in." About one o'clock in the morning, a great explosion shook the entire city. It was the well coming in, but instead of oil it proved to be gas. As the jet of gas struck the derrick, a lantern hanging at the top was blown off and the gas became ignited. A column of fire, 400 ft. high and several feet wide, shot into the air, illuminating the surrounding country. The roar could be heard for miles and the heat was intense. It was estimated that there were 300,000,000 cu. ft. of gas burning during a 24-hour period. For the first two hours the column of fire remained at a height of between 350 and 400 ft., and then died down suddenly for a few moments. A second explosion started it afresh, and it remained burning for two days. Pipe lines were constructed, and the well was filled with dirt, which extinguished the fire. The well proved to be a wonder.

SIDEWALK ELEVATOR GATES REMOVE ALL DANGER

If newly constructed guards, or gates, are used, no one need fear the sidewalk elevators which rise so suddenly, and sometimes without warning. The gates lie flat against the building when not in use, but when the elevator begins to ascend, the gates are automatically swung outward by the movement of the elevator mechanism. The descent of the elevator causes the gates to swing back against the wall of the building again, entirely out of the way of passers-by. An added feature of the gates is that they can be adjusted so as to stop the elevator if a pressure of 10 lb. or more be applied against them. Thus, should a child happen to be standing on or near the covers when the elevator starts, a slight pressure would stop the machinery and avoid accidents.



Left: The Gates Folded Back against the Building. Center: The Gates are Shown Automatically Opened by the Rising Elevator. Right: The Elevator is Seen at the Sidewalk Level

"DAM IS BREAKING!"—HEARD FOUR MILES

Human Voice Broadcast over Vast Area—Flood Warnings Given to Isolated Communities and Individuals—Feat Made Possible by Remarkable Tests Conducted in Catskill Mountains

By H. A. LANE

TERRIBLE disasters have been caused by the irresistible swirl of rushing floods, in which unsuspecting persons were caught without warning. In one instance, years ago, a gay party on a four-horse tallyho was enthusiastically exploring the wonders and beauties of Turkey Creek Cañon, near Golden, Colo. Gathering raineclouds failed to cast a shadow upon their high spirits, and no serious thought was given to danger from the rapidly approaching storm, because the tourists were not familiar with the characteristics of the local tempests, nor with the topography of the surrounding country.

The storm suddenly burst with great fury upon the unprepared pleasure seekers, and the deluge of water caused them quickly to abandon the tallyho and hunt for shelter. Closely huddled against the towering sides of the cañon, they soon realized, with anxiety, that they had not reckoned with the forces of nature. The terrific rush of water down the cañon sides swept them from their feet, and down to the bed of the cañon, where a torrent of water now raged. Despite their struggles, many of the party lost their lives, and those surviving were seriously injured.

Another instance was the great flood at Johnstown, Pa., which happened many years ago. Much of the disaster, and many fatalities could have been prevented if warnings had been hurled through space in advance of the cruel waters.

More recent was the disastrous flood at Pueblo, Colo., where the toll of lives, and property damage, reached enormous proportions, much of which would have been averted, had some kind of warning been given.

As a protection against such terrible events as these, a system of huge telephone transmitters and amplifiers has been produced, which will throw the human voice a distance of four miles. Extensive tests have been made with this apparatus, which have proved the practicability and success of the endeavor. These tests were conducted in the Catskill Mountains, by a specially trained group of operators. A tower, 30 ft. high, was erected to hold the gigantic amplifiers and the immense projectors which measured 15 ft. in length and 4 ft. in height.

To determine just how far the human voice could be heard with these aids, was accomplished in rather a weird manner, because the time selected was at night. Four men took up previously agreed-upon stations, at distances of one, two, three, and four miles from the tower. As the time drew near for the experiments, the four men applied matches to specially prepared torches, which gave large flaring flames.

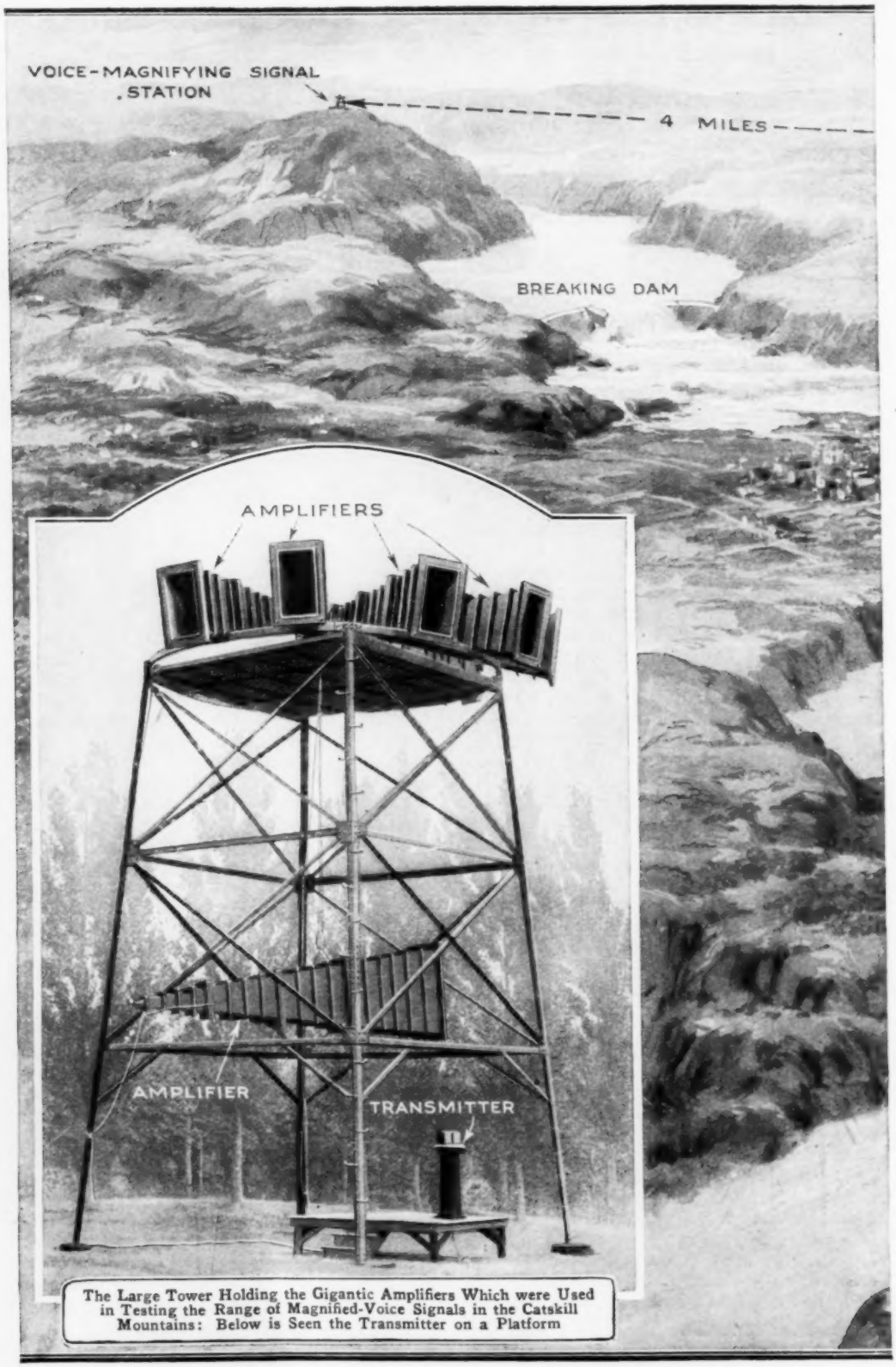
Meanwhile, at the tower, were gathered a party of men chosen to observe the tests, and who interestedly watched the tiny flickering torches in the distance. When the "zero hour," or time set for the tests, arrived, the operator at the tower took his place before the transmitter of the apparatus, and in a natural tone of voice, ordered the far-off men to wave their torches.

Breathlessly the watchers at the tower peered through the inky blackness at the flickering points of fire, and the nearest torch was seen to describe vigorous circles in the air. Exclamations of satisfaction came from the watchers, which rose to a shout, as the second, then the third, and finally the fourth torch was seen to dip and wave wildly in the darkness, thus showing plainly that all the men had heard the command. The operator at the transmitter then spoke to the men again, in reply to their ready signals, and bade them wait for further instructions.

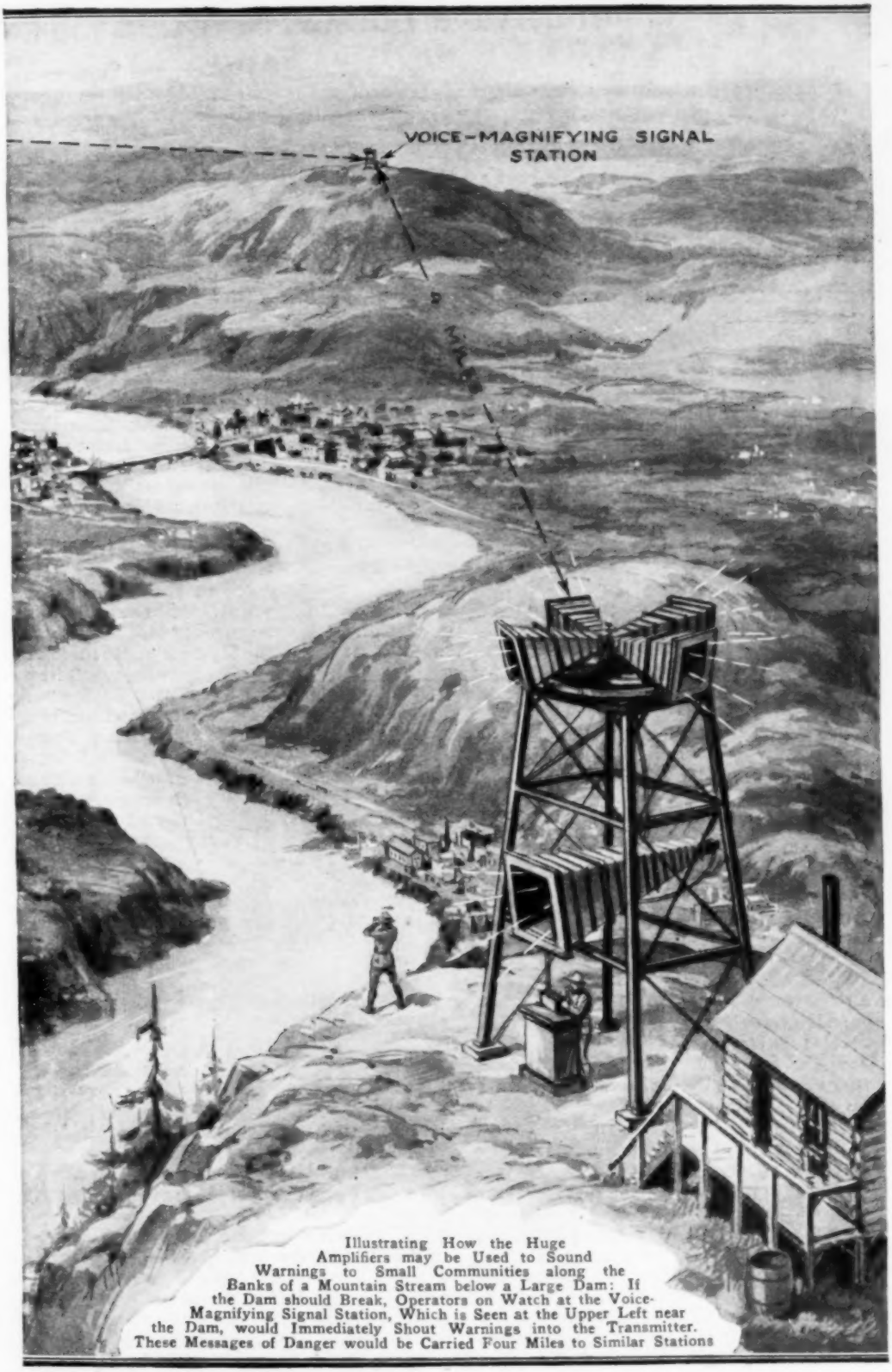
The next test was made with a phonograph, which was placed before the transmitter, and several records of well-known music were produced. Before playing the machine, the operator spoke to the waiting torch bearers, telling them what the nature of this test would be, and instructing them to make a note of the tunes, and the order in which they were played. After he had delivered his orders, he again asked them to signal him if they understood the instructions. And again the four torches waved vigorously.

Several pieces were then played with the instrument, and at their conclusion the tower operator announced briefly to the far-away listeners that the experiments were completed and that they should extinguish the torches and make their way back. The party at the tower then saw the torches disappear, one by one, into the blackness of the night.

When the men returned, each was



The Large Tower Holding the Gigantic Amplifiers Which were Used in Testing the Range of Magnified-Voice Signals in the Catskill Mountains: Below is Seen the Transmitter on a Platform



Illustrating How the Huge Amplifiers may be Used to Sound Warnings to Small Communities along the Banks of a Mountain Stream below a Large Dam: If the Dam should Break, Operators on Watch at the Voice-Magnifying Signal Station, Which is Seen at the Upper Left near the Dam, would Immediately Shout Warnings into the Transmitter. These Messages of Danger would be Carried Four Miles to Similar Stations

found to have a correct list of the tunes, and the order in which they were played. Thus every one of the tests proved a success, and the time, labor, and money expended were considered small in comparison with the results obtained.

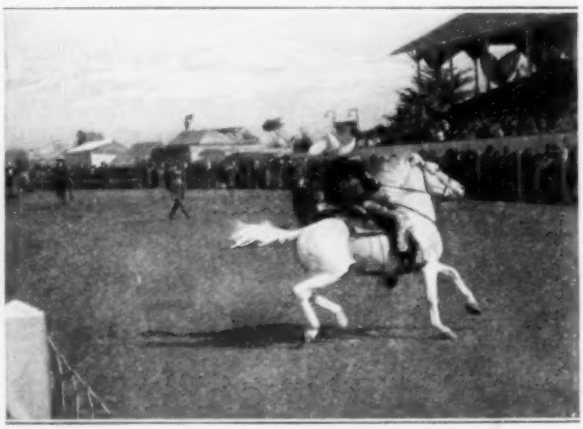
A NEW KIND OF HORSE SHOW

By FRANK B. HOWE

EVERY now and then some courageous soul, with sufficient boldness to kick over the traces and upset the established custom, comes along and introduces an innovation in some traditional undertaking. If he can stand the criticism, he generally contributes something to humanity.

A Chariot Race Not Only Displayed the Merits of the Horses but at the Same Time Furnished Real Entertainment for the Spectators

In this case the "kicking over the traces" figure is appropriate, for the subject is a horse show.



A Cowboy Putting One of the Competing Stallions through Various Paces to Test and Show Its Intelligence: Similarly, Saddle Horses and Animals of Other Classes Performed Their Specialties

Heretofore, at such events, helpless spectators have sat in the grandstand and watched the "thrilling" spectacle of an unending procession of horses being led past a little group of judges. After some hours of this, a man with a megaphone announces that such-and-such a horse has won; the chief judge pins a blue ribbon on the animal's bridle, and the crowd departs.

Determined to make their horse show as interesting for the spectators as it was for themselves, a group of horsemen at a recent Pacific-coast show completely upset precedent when they announced that entered horses must actually perform their specialty, instead of being led past the judges by a groom. In other words, polo ponies must play polo; saddle horses must be ridden through all the various feats that prize saddle horses are supposed to accomplish; chariot racers must draw chariots, and so on.

The innovation was a complete success, and the crowded grandstand testified to the public's approval of the change. According to psychologists, the public like action. They got it here. Instead of the tedious procession of innumerable horses, they first saw a group of horses play polo. Then another group staged a chariot race. Some fine stallions performed various feats designated to show their intelligence. A number of cow ponies went out and showed how they helped their cowboy riders brand cows. After this, horse-show audiences are not likely to be content with the "procession method" of judging.

¶Tolls for a telephone call from Chicago to California, by which the purchase of a down-town Chicago building site was arranged, amounted to several hundred dollars. A 21-story office and shop building will be erected on this, and adjoining, property.

BLIND AND DEAF GIRL DEVELOPS WONDERFUL SENSE OF TOUCH AND SMELL

By FRED L. HOLMES

READING the wireless telephone by the sense of touch is the new accomplishment of Willetta Huggins, age 16, the blind and deaf girl of Janesville, Wis. By placing her fingers on the diaphragm of the receiver, she gets the vibrations of the human voice and is able to understand. She has been blind and deaf for three years. Without instruction, she has developed in that time an uncanny sense of touch that seems, in a measure, to take the place of her lost faculties.

A Highly Developed Sense of Touch Enables This Girl, Who Is Absolutely Deaf, to Read a Wireless-Telephone Message by Placing Her Fingers on the Diaphragms of the Receivers

During September, 1921, the girl discovered that by placing her finger upon the diaphragm of a telephone receiver she could read conversation. She has always had the faculty of speech. With this discovery she soon learned that she could conduct a telephone conversation almost as well as any normal child of her age. But Willetta Huggins' sense of touch was to be given a new thrill. The girl was brought to Madison, Wis., on last November 1, to visit Gov. John J. Blaine. She was taken to a news-service office to ascertain if she could read the wireless telephone, and a score of persons, including Maj. E. A. Fitzpatrick, secretary of the State Board of Education; Mrs. J. T. Hooper, superintendent of the blind school at Janesville; J. G. Crownhart, newspaper correspondent and wireless operator, and a score of others were asked to be present.

Arrangements were made with Prof. E. M. Terry, head of the department of physics at the University of Wisconsin, and Malcolm P. Hansen, wireless operator, to send the girl a message by radio telephone. No one in the room knew what the message would be. To the amazement of the audience, the blind and deaf girl with her fingers in the two receivers was able to read this message:

"My dear Miss Huggins: I am glad to have the privilege of addressing such a remarkable girl by radio telephone. Never before have science and a wonderfully developed human sense together effected such a transmission of intelligence. Good-by. Good luck. — Malcolm P. Hansen, Wireless Operator."

"He calls me 'dear Miss Huggins,'" declared the girl as soon as the message was started and she laughed about it as if it were a slight embarrassment to be so familiarly addressed by a stranger.

When the message had first been received, Mr. Hansen repeated it, fearing that the girl had not received it the first time it was transmitted.

"He is repeating it," said Miss Huggins. "I know what he said the first time."

When the repetition of the message had been completed, after coaxing by Mrs. Hooper, she told the people present, almost word for word, what the operator had sent her.

Equal to Her Sense of Touch Is That of Smell, by Which She Distinguishes Colors

But a still more striking demonstration of her sense of touch was to be given. After the message had been completed by the use of the regular telephone, it was transmitted to the receiving office and typewritten. Half an hour later, after many other experiments had been tried with the girl, successfully—the telling of colors by the sense of smell, and the denomination of bills

by touching the numerals on them—she was handed the typewritten sheet and asked if there was a message on it. She ran her hands over the typewritten wording.

"Oh! This is the same message they

By Placing Her Hands upon Their Chests or Heads, She Is Able to Carry on a Conversation with Two Persons at the Same Time

sent to me from the university," she exclaimed.

The radiophone message sent by the university was on a wave length of 800 meters, and the instrument used in taking it off was an audion detector with a one-step amplifier with but a 50-ft. two-wire antenna on the roof of a three-story building. The audibility of the message was sufficient to enable those who were not equipped with receivers to hear the entire message while Miss Huggins read it with her delicate fingers, repeating phrases that amused her as they traveled through the ether. While the same radiophone set has been heard as far as Independence, Mo., the fact that this little girl was able to put her sensitive forefinger on the diaphragm of the receiver and thus read the message, amazed the expert physicists and wireless experimenters of the university.

Almost as marvelous as is the girl's sense of touch is her sense of smell. She can tell how many people are in the room by this sense, and how many are strangers. Willetta Huggins was locked in a bank vault at Chippewa Falls and given six envelopes, each containing yarn of a different color. She wrote the answers on each envelope correctly.

"What is the color of my waist?" asked one girl. She smelled.

"It's white," declared the blind and deaf girl, "but the collar is edged with yellow."

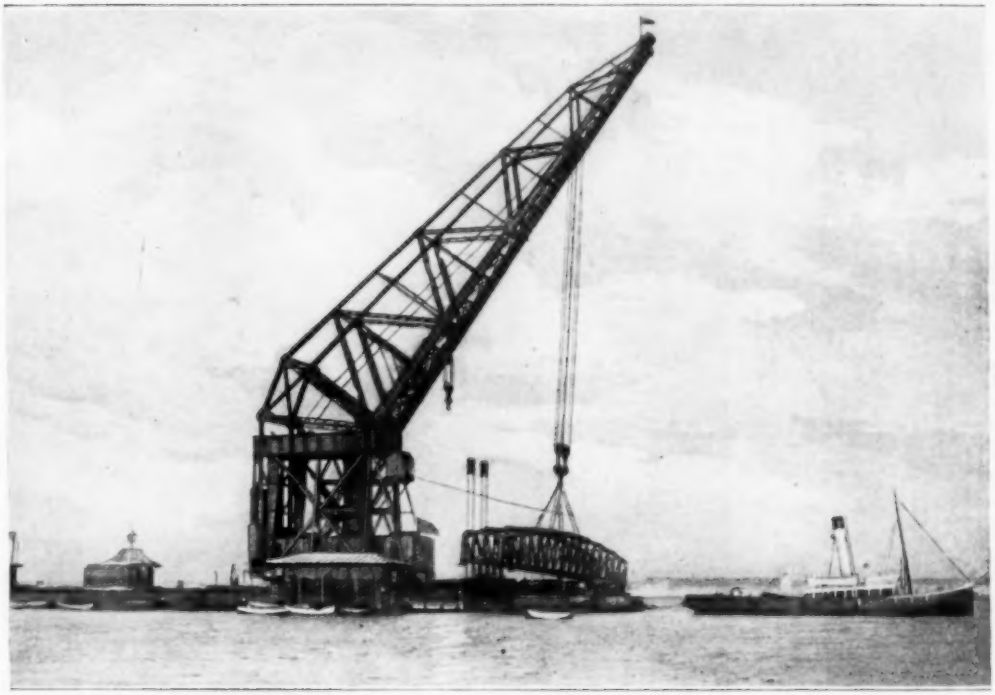
"And the color of my suit is what?" asked Governor Blaine. The girl put her nose to the cloth.

"It's gray and black—a mixture," came the girl's correct answer.

Miss Huggins is a human sounding board. She places her hand on your head or shoulders and is able to conduct a conversation in rapid order, or she can conduct two conversations with two people at the same time.

Willetta Huggins was slow and plodding in her school work when a child. With failing eyesight she was sent from her home at Chippewa Falls to the school for the blind at Janesville when 10 years of age. In October, 1919, without any forewarning, she suddenly became stone-deaf. A year later she was stone-blind. For six months she groped despondently in the dark. She refused to be comforted. One day she brushed against one of her teachers who was talking and got the vibration of her voice. Then she placed her hand on the teacher's head and found that she could understand. Since then her development has been rapid.

"Willetta Huggins is a wonder," said Superintendent J. T. Hooper. "Not herself, but what she may teach to the educational world may be more wonderful than education alone. With defective sight and defective hearing, two imperfect avenues of approach to the brain, she was dull, stolid, discontented, and made no progress whatever in intellectual development. Even the work with her hands was much inferior to what it is now. When these two imperfect avenues of approach were cut off and she was forced to use the most perfect avenue of all—the sense of touch—she immediately became interested, happy, intelligent, and made very rapid progress both with her head and hands. The question arises in my mind if we are not attacking the educational problem from the wrong angle. Should not every child be made perfect in so far as possible by the physician, the nurse, and social worker before being sent to the educator?"



Giant Floating Crane Belonging to the Port of Liverpool, England, in the Act of Lifting from Its Abutments a 150-Ton Bridge: It Carried the Bridge down the River Mersey from New Brighton to Seacombe, a Distance of Nearly Two Miles, to a Repair Shop

FLOATING CRANE TAKES BRIDGE TO REPAIR SHOP

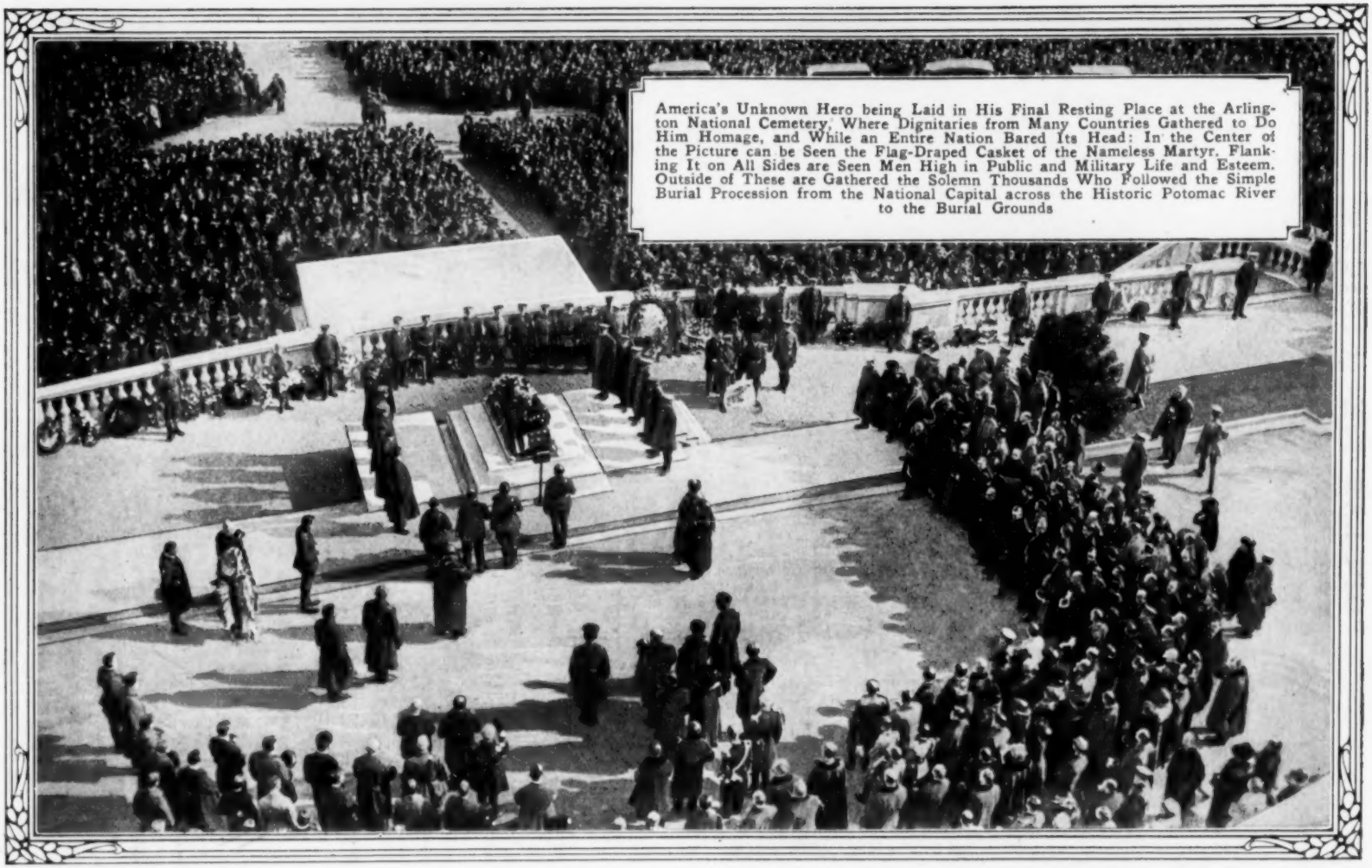
After lifting bodily a bridge weighing 150 tons from its abutments at New Brighton, Eng., a giant floating crane carried the bridge a distance of about two miles down the river Mersey to a repair shop at Seacombe. This mammoth crane, which has a lifting capacity of even more than 150 tons, was originally intended for Russia.

ATTACHMENT TO ASSIST BLIND TYPEWRITER OPERATORS

A blind Englishman, a victim of the war, has invented an attachment which enables him to operate and fully control a typewriter. Difficulty was found in determining when the end of the sheet was being reached and in taking out and reinserting sheets. The attachment that overcomes these troubles consists of a trough-shaped aluminum stamping. A flat spring, with its end wound on a spool at the top, passes through the trough and terminates in a clip. The paper is inserted in the clip and held by a screw. A projection on the clip enables one to set the paper absolutely square. A tiny point sticks into the paper so that its exact position can be determined if taken out and reinserted. As the end of the paper approaches, the clip operates a trip lever and rings a bell. Braille characters stamped on the side aid in the adjustment to any length of paper.

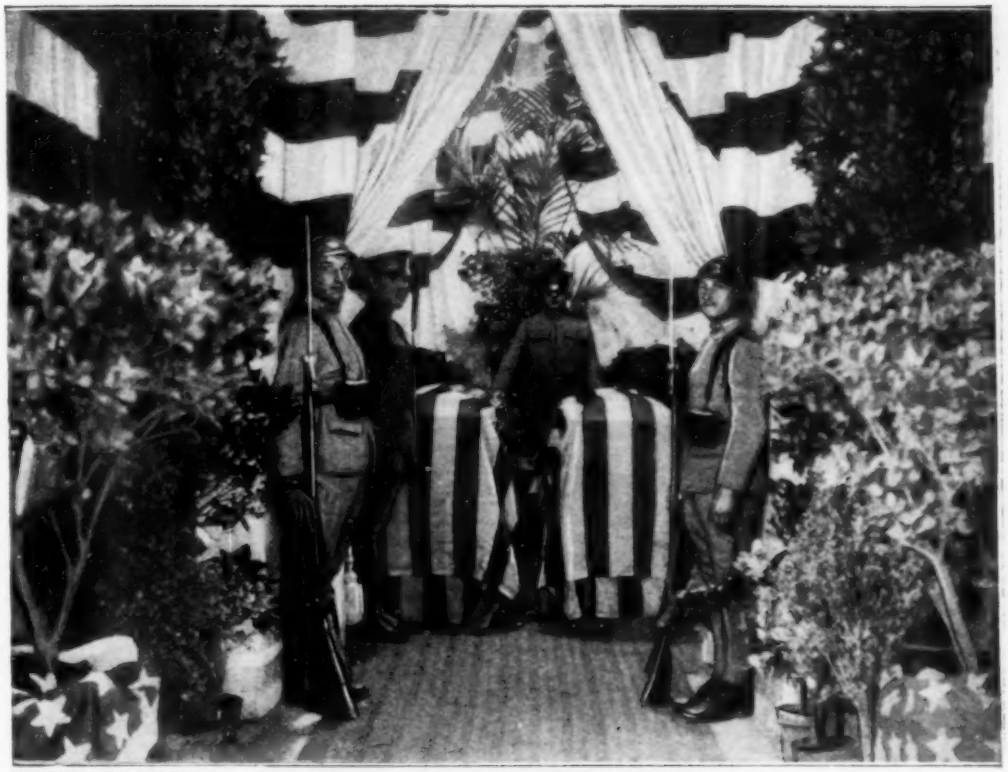
This Device, Attached to the Carriage of an Ordinary Typewriter by Means of the Bracket, Enables a Blind Person to Control the Machine

¶ When you want anything and do not know where to get it, write Bureau of Information, Popular Mechanics, Chicago.



America's Unknown Hero being Laid in His Final Resting Place at the Arlington National Cemetery, Where Dignitaries from Many Countries Gathered to Do Him Homage, and While an Entire Nation Bared Its Head: In the Center of the Picture can be Seen the Flag-Draped Casket of the Nameless Martyr. Flanking It on All Sides are Seen Men High in Public and Military Life and Esteem. Outside of These are Gathered the Solemn Thousands Who Followed the Simple Burial Procession from the National Capital across the Historic Potomac River to the Burial Grounds

WIDE WORLD PHOTOS



COPYRIGHT, KEYSTONE VIEW CO.

In the Center are Seen the Flag-Draped Caskets Containing Four Unknown Heroes. From These Four Bodies, Exhumed in Different Cemeteries in France, One was Chosen to be Taken "Home" to Receive the Greatest Honors Ever Bestowed upon a Hero. The Honor Guard Shown Here is Composed of American and French Soldiers

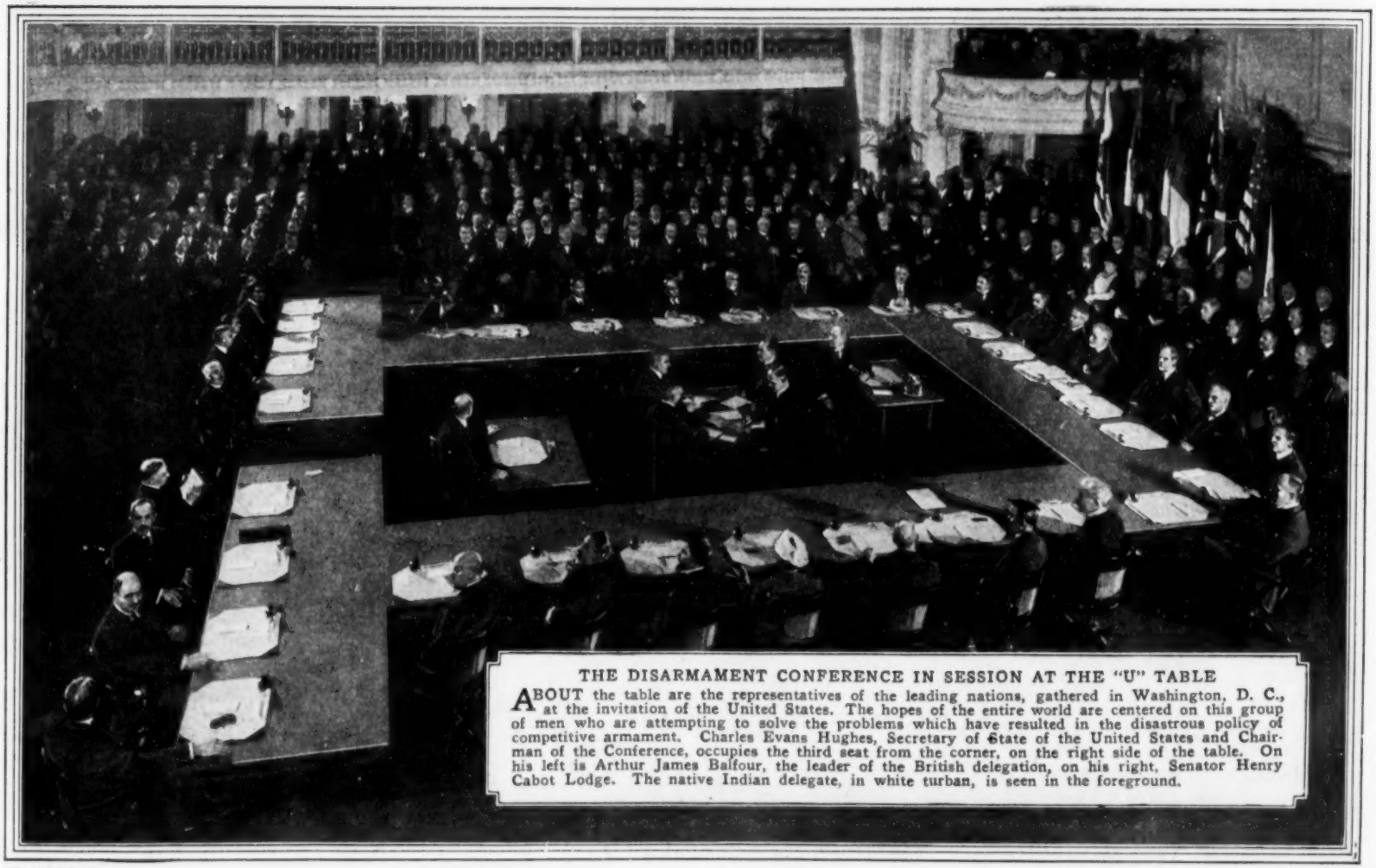
THE STORY OF THE UNKNOWN HERO

IN solemn silence, on October 23, specially chosen bodyguards took up their honorary posts beside the exhumed remains of four American heroes, in as many different cemeteries, in France. From these four widely separated localities, the bodies were taken to Châlons-sur-Marne. At this city, the guards were amazed to find three other detachments of soldiers, who were guarding similar charges, because it was commonly known that only one body was to be taken to America. To add to their mystification, they were all temporarily relieved from duty.

In order that the identity of these martyrs might be forever lost to the efforts of delving historians, or selfish individual interests, measures were taken thoroughly to "unidentify" the bodies. During the night, while the guard was relieved, persons unknown to the soldiers took the remains from the caskets, and interchanged them. The caskets were also shifted about, so that when the guard was posted the following morning, none could have told which body reposed in any particular casket.

With simple solemnity, one of the bodies was then designated as the one to be prepared for the long journey back over the ocean, and "home." Not, however, to the home whence came the soldier in performance of his duty, but to a home in which he would be buried with the greatest honors ever accorded a military hero. Orders were then given to take the caskets containing the bodies of the three remaining, and thus honored heroes, to the cemetery at Romagne-sous-Montfauçon, where they were interred without ceremony.

Because of these efforts by the government to obliterate all individuality and personality from this Unknown Hero, the reverential solemnity of his burial in the Arlington National Cemetery expressed a nation's devotion to the memory of the thousands of soldiers who found eternal rest beneath the soil of France.



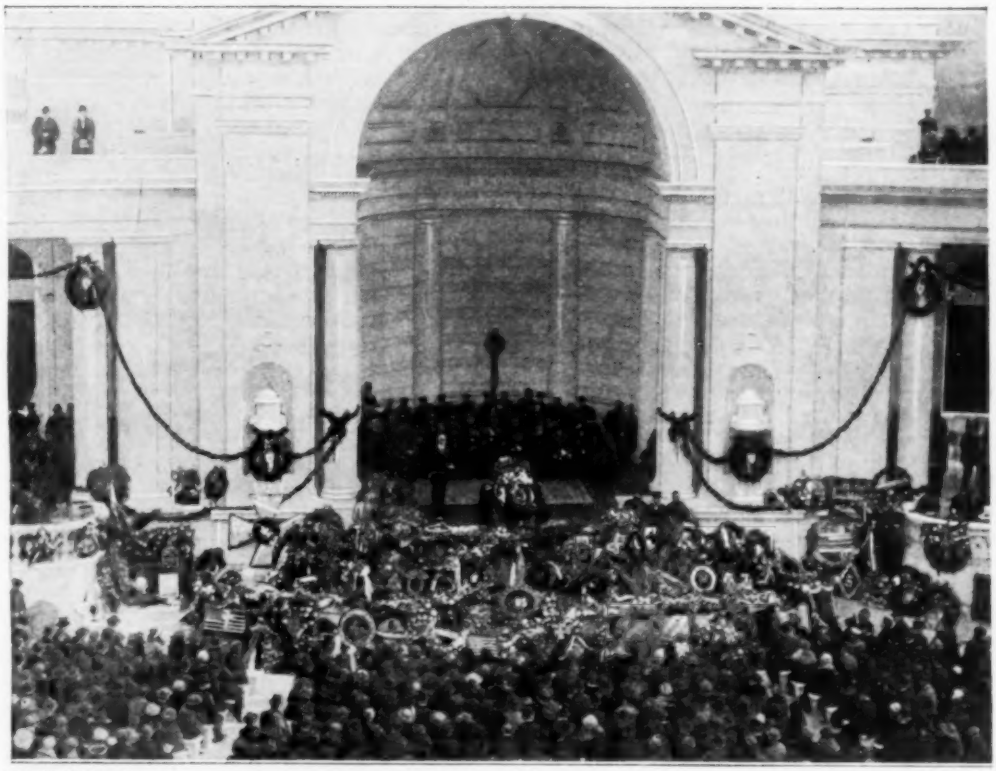
THE DISARMAMENT CONFERENCE IN SESSION AT THE "U" TABLE

ABOUT the table are the representatives of the leading nations, gathered in Washington, D. C., at the invitation of the United States. The hopes of the entire world are centered on this group of men who are attempting to solve the problems which have resulted in the disastrous policy of competitive armament. Charles Evans Hughes, Secretary of State of the United States and Chairman of the Conference, occupies the third seat from the corner, on the right side of the table. On his left is Arthur James Balfour, the leader of the British delegation, on his right, Senator Henry Cabot Lodge. The native Indian delegate, in white turban, is seen in the foreground.

WIDE WORLD PHOTOS

ELECTRICAL ACHIEVEMENTS SIGNALIZE UNKNOWN HERO HONORS

By JOHN W. KEAN

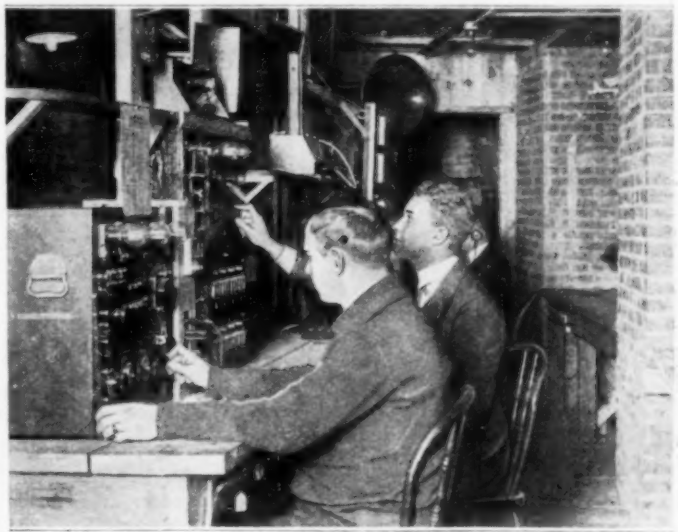


WIDE WORLD PHOTOS

President Harding Delivering the Funeral Oration over the Remains of the Unknown Hero at the Arlington Cemetery Amphitheater: In Front of the President is Seen a Stand Which Contains a Specially Made Telephone Transmitter to Carry the Speaker's Voice to the Amplifier Room in the Basement of the Amphitheater

A MECHANICAL device, operated in connection with a highly efficient communication system, transmitted President Harding's address, delivered over the remains of the unknown soldier at Arlington Cemetery on Armistice Day, to our Atlantic and Pacific coasts. With the aid of this device thousands in and around the beautiful amphitheater at Arlington, other thousands in and around Madison Square Garden, New York City, and still other thousands in and around the Civic Auditorium at San Francisco, heard the President's every word.

While speaking, the



This Is the Amplifier Room in the Basement of the Arlington Amphitheater, Showing the Apparatus Used to Broadcast the President's Address to the Thousands in Attendance There as Well as to New York City and San Francisco

President stood near a small box, about 4 in. square, which rested on a little stand. In this box was a black disk like the ordinary telephone transmitter, but, in fact, a new special type of transmitter developed within the last few months by the engineers of the American Telegraph and Telephone Company, and successfully demonstrated for the first time at Arlington.

The commercial telephone transmitter is efficient for its purpose, but it has a tendency to accentuate certain tones in the voice. In ordinary conversations this is not particularly noticeable, but when used in connection with voice-magnifying devices, these improperly accented tones become very pronounced. This difficulty has been entirely overcome in the amplifier used at Arlington with the new transmitter.

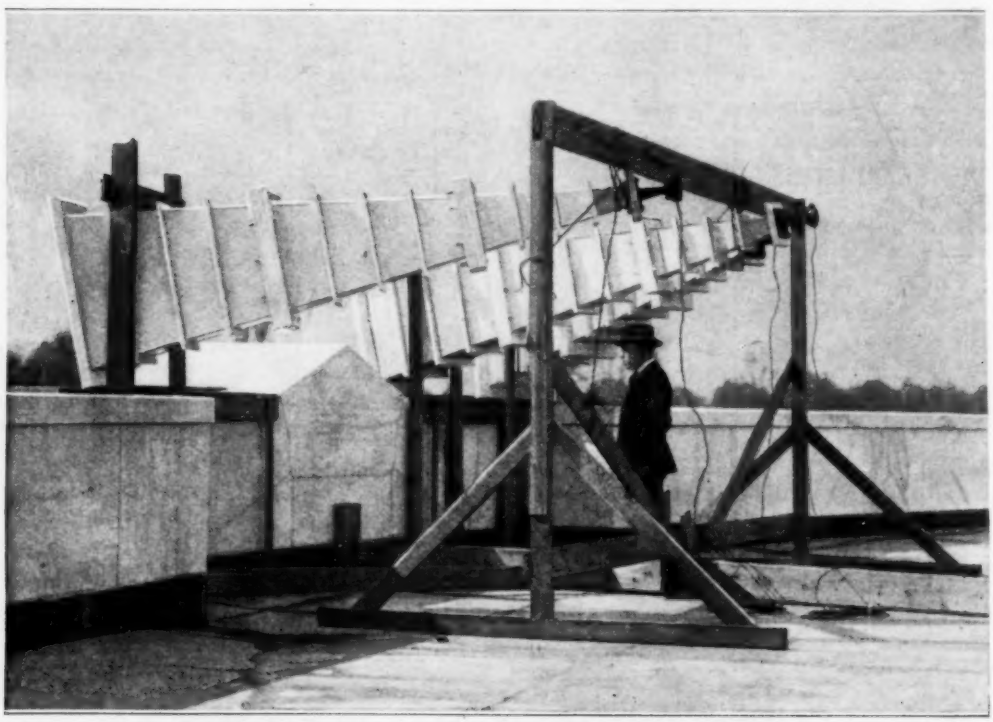
Working to this end the engineers said in effect: "We are taking the voice of the speaker as sent through the ordinary transmitter, with its imperfections, and amplifying it; suppose we try reducing the sound of the voice and then amplifying it."

Following this theory they developed a transmitter with an abnormally high frequency which transmitted the voice in a much weaker tone than the ordinary transmitter. It caught the essential vibrations, however, and maintained the character or individuality of the speaker's voice. With the aid of the amplifiers these essential vibrations were built up. The theory proved correct in practice, and the President's voice was sent out without an imperfection, to the listening thousands.

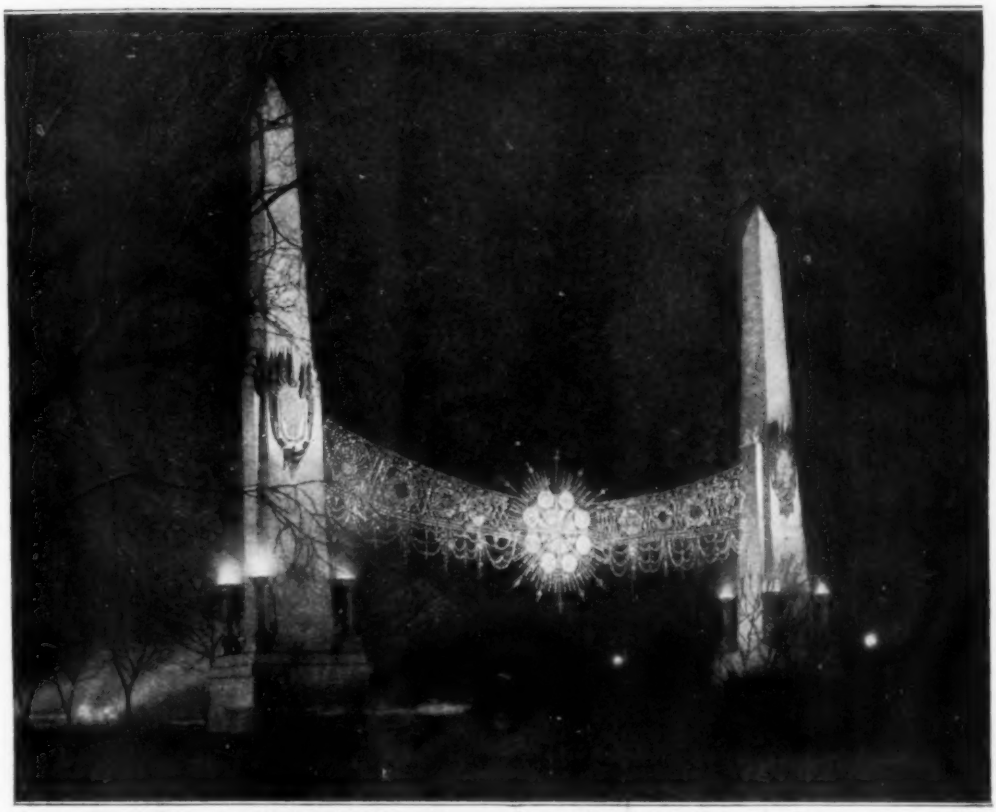
Further, to protect the new transmitter from vibrations other than those caused by the voice of the President, the little black disk was hung from the roof of the box by rubber bands, and the front of the box was covered with cheesecloth, to break any stray breeze that might wander in.

From the box, which stood near the casket of the unknown soldier, wires led to a room beneath the amphitheater stage. Here all was quiet, but the amplifiers were doing their work.

After being magnified, the electric vibrations carrying the President's address were sent over two sets of wires. One set led to telephone receivers in and around the amphitheater at Arlington, the other led to the long-distance lines

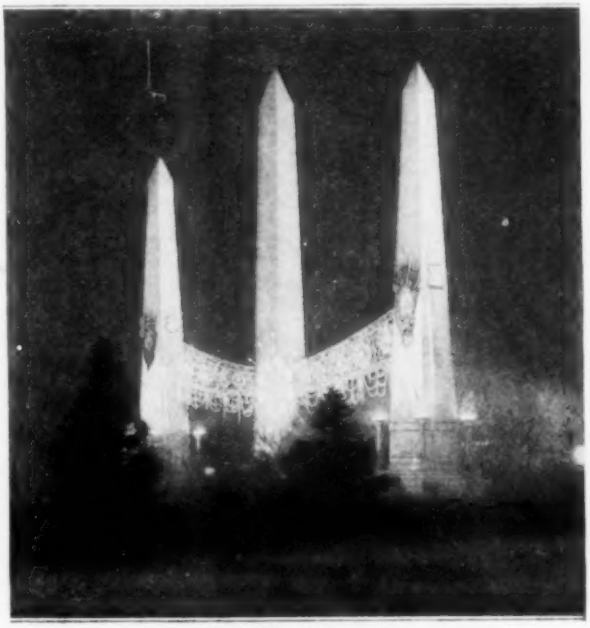


By Means of These Enormous Projectors That were Mounted on the Roof of the Arlington Amphitheater, the Thousands of Persons Surrounding the Place were Enabled to Hear Distinctly Every Word of President Harding's Speech Delivered in Honor of the Nation's Unknown Hero



Above: The Brilliant Jeweled Panel Which Forms a Spectacular Approach to the Pan-American Building Where the Limitation of Arms Conference is Held. Below: An Unusual View of the Portal with the Washington Monument Appearing in the Center. This Photo, Taken from Inside the Pan-American Building, Makes the 85-Foot Portal Towers Seem as High as the 555-Foot Monument

for transmission to receivers at Madison Square Garden, and to receivers at the Civic Auditorium, San Francisco. The diaphragms of these receivers were of specially treated linen. The electric waves passing through coils in the receiver vibrated a small armature between the coils and the poles of a permanent magnet. The vibrations of the armature



COPYRIGHT, GREEN, WASHINGTON, D. C.

carried to the diaphragm created the sound which was sent out by the horns, or as they are technically termed, projectors.

To insure that the people within the amphitheater, and at the other points, would hear the President's address without any echoing sounds, or other disturbances due to the amplifiers, many problems in the correct placing of the receivers

and of the horns were satisfactorily solved. So perfectly were the difficulties overcome that it was impossible for a person to tell, no matter where he was located at Arlington, whether he was listening to the President's actual voice, or his voice after it had passed through the amplifiers.

COPYRIGHT, GREEN

The Dome of the Capitol Building on Armistice Night When Added Illumination from Searchlight Batteries was Thrown on It

And to insure just as wonderful a performance for the listening thousands in New York City and San Francisco, every possible precaution was taken.

Two 25-pair cables, one to be used in case the other failed, were built especially for the occasion, and ran from the basement room of the amphitheater to a point a few blocks away, where they were connected to long-distance lines. Each of the 25 pairs in each cable made a single circuit. One pair carried the voice current; others carried telegraph circuits, over which operators at stations in the larger cities along the line kept in continual communication. At each of these emergency stations were additional sets of amplifiers to keep the voice-carrying current up to the necessary strength for its long travel.

In Washington, current was secured from the local electric-light company, adapted by special machinery for use in the amplifiers and other equipment. As a protection against loss of power from the local company, storage batteries capable of supplying the necessary current for several hours were installed.

The Armistice Day ceremonies were symbolic. As part of those ceremonies, and also as part of the welcome to the visiting members of the Disarmament Conference, some very beautiful decorations were erected near the Pan-American Building and the Continental Memorial Building. Both buildings, and also the Red Cross Building, which is in this group, are of beautiful white marble, classic in design.

On Seventeenth Street, near the Pan-American Building, two obelisks—miniature Washington Monuments, 85 ft. high—were erected. These obelisks were covered with imitation jewels made in Austria. In refractive power they are about halfway between cut glass and diamonds.

Between the towers was swung a banner, also contrived of these jewels, 34,000 in all, in seven different colors. Woven into the banner were designs representing the flags of the nations that have sent delegates to the conference.

Armistice night, President Harding touched a button, and batteries of searchlights played on the jeweled banner. As soon as the lights were turned on, a battery of four French guns, located near the Washington Monument, fired a presidential salute—21 guns. As the smoke from the guns drifted toward the heavens, other batteries of searchlights played on them in red, white, and blue colors. Still other batteries bathed the dome of the Capitol and the Washington Monument in light. In all, these searchlights represented 4,950,000,000 candlepower.

From the President to the plain citizen, who was on hand to the number of 50,000, the illumination was pronounced a beautiful sight.

U. S. S. "MARYLAND" SPEEDIEST ELECTRICALLY DRIVEN SHIP

The U. S. battleship "Maryland," at its official trials, November 14, developed a speed of 25.9 miles an hour, being a record for electrically driven ships of its class. The contract speed was 24.18 miles, which was exceeded on five high-speed runs by more than .86 of a mile. Successful anchor-gear tests were also made. The full-load displacement of the "Maryland" is 33,590 tons, with a developed horsepower of 36,673. The "Maryland's" sister ship, the "Tennessee," has never exceeded a speed of 24.6 miles an hour, and has never developed more than 30,909 horsepower.

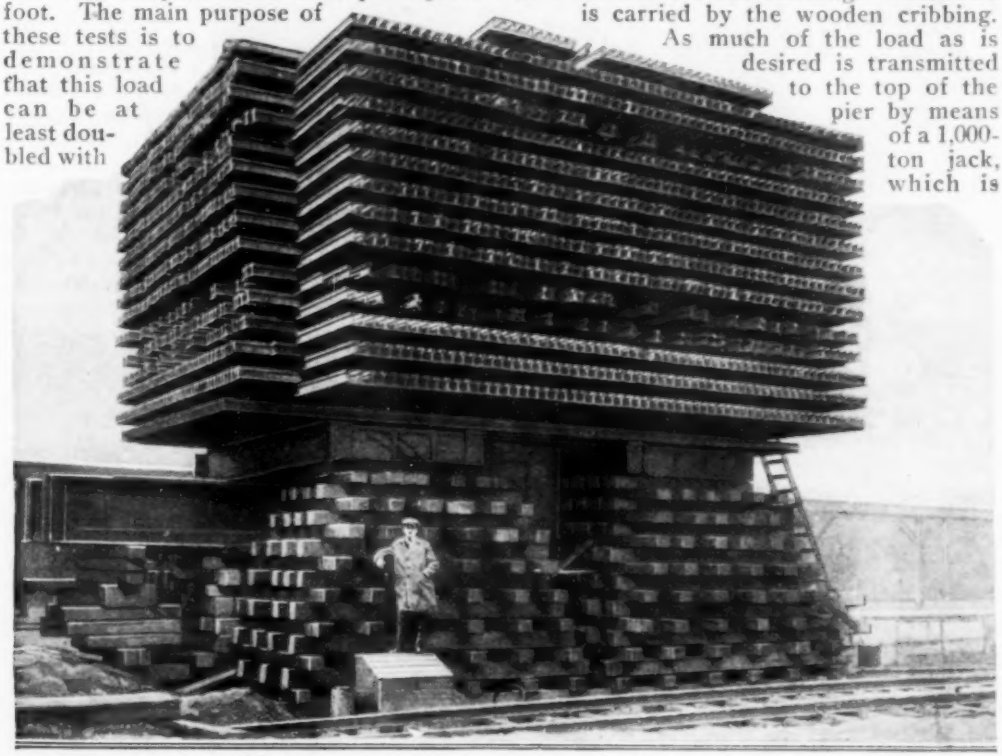
EPOCH-MAKING TESTS OF FOUNDATION PIERS

Tests of the Piers for the New Union Station at Chicago That may Revolutionize the Allowable Load on Piers and Caissons in the Future

By HENRY S. WHITE

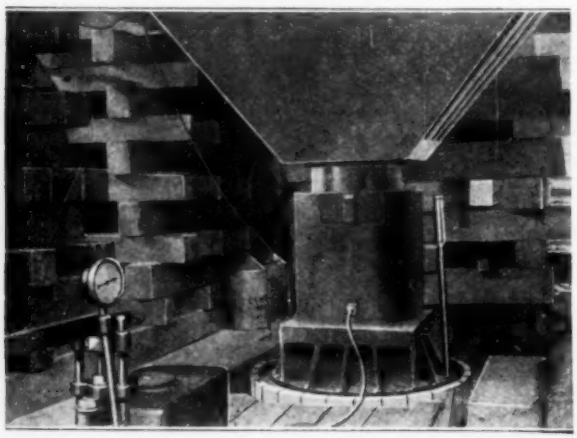
BY ACTUAL test, the determination of the exact conditions resulting from placing on a foundation pier three times its allowable load is a thing that has never been done as it is now being done, in connection with the new Union Station at Chicago. The results obtained will be valuable not only to the designers of this huge building, but will also be of incalculable benefit in the design of all future buildings in Chicago, or any other city with similar soil conditions.

For the purpose of carrying out these tests, two special foundation piers were sunk in the railway yard, where tracks were available for transporting the steel that was to be used and for operating the traveling crane erecting it. These piers are of 4-ft. diameter, one with a belled base and the other without one. The bottom diameter of the belled base is 8 ft. 4 in., having, therefore, an area of 54½ sq. ft. The piers are sunk to hardpan, which is at a depth of a little over 70 ft. By city ordinance, the allowable load on hardpan is six tons per square foot. The main purpose of these tests is to demonstrate that this load can be at least doubled with perfect safety on the foundation piers of the new station building, and, by inference, on any future buildings in Chicago. To make this demonstration more positive, the piers are being tested, not only with double, but with three times the allowable load. That means 18 tons to the square foot, and as the area of the base of the belled pier, which is the one now being tested, is 54½ sq. ft., the load required—18 times 54½—is 981 tons. Therefore, in order to make the test, over 1,000 tons of steel were piled up above the pier. For the accommodation of a lifting jack, that will be described later, the steel had to be supported on two piles of wooden cribbing made of railroad ties, at an elevation of 11 ft. 4 in. above the ground level. On top of this is placed, on each pile of cribbing, a row of eight 24-in. I-beams, and on top of these are piled, crosswise, 30 layers of 130-lb. rails, 33 ft. long, to the number of about 1,400, with a total weight of over 1,000 tons—as great a weight as all the structural steel in a fair-sized office building. This load is carried by the wooden cribbing. As much of the load as is desired is transmitted to the top of the pier by means of a 1,000-ton jack, which is

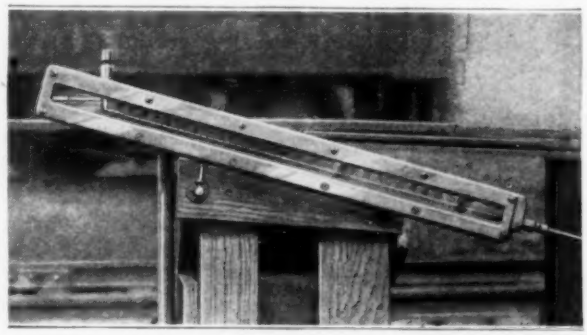


Huge Pile of 130-Pound Rails Supported on Cribbing for Testing a Foundation Pier of the New Union Station Building at Chicago: In the Pile Are Over 1,400 Rails, Which Laid End on End would Stretch Nine Miles

the first of its kind ever built. Although the jack has this enormous lifting capacity, its cast-steel cylinder operates a semisteel lifting ram of only 21-in. diameter. Its over-all height is 3 ft. 1 in. By calculation it will be seen that the pressure required on the ram is nearly 6,000 lb. per square inch. Connected with the jack by a heavy ½-in. pipe is a plunger pump that, by means of a liquid known as hydraulic oil, applies the required pressure. In the pipe line is a gauge that registers the number of tons lifted by any pressure, so that it can be seen at a glance what load is being carried by the pier. Any settlement of the pier is read on what is known as a differential draft gauge. Connected with the jack is a vertical tube containing colored alcohol, such as is used in spirit thermometers, and this is piped to the gauge, which is inclined at an angle of about 15°, so that any fall of the liquid in the vertical tube is exaggerated in the sloping gauge, and very close readings can be made. As a check, duplicate readings of the settlement are made with a surveyor's level.



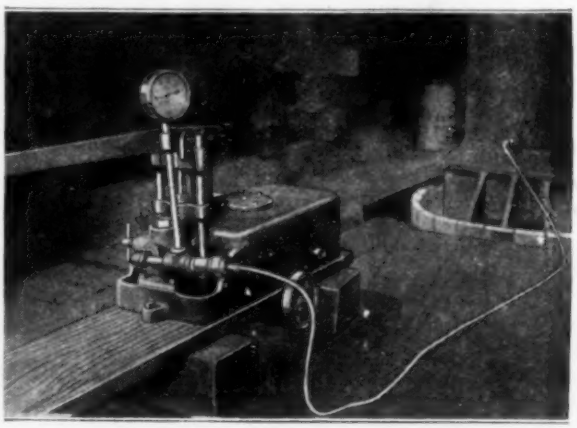
One-Thousand-Ton Lifting Jack, the First of Its Kind Ever Built: It Is between the Cast-Iron Base That Rests on Top of the Pier being Tested, and the Much Larger Casting Above That Supports the Load It Lifts



Differential Draft Gauge upon Which is Read with Great Precision Any Settlement of the Pier under Test: The Inclination of the Gauge Exaggerates the Fall of the Colored Alcohol in a Vertical Tube to Which It is Connected

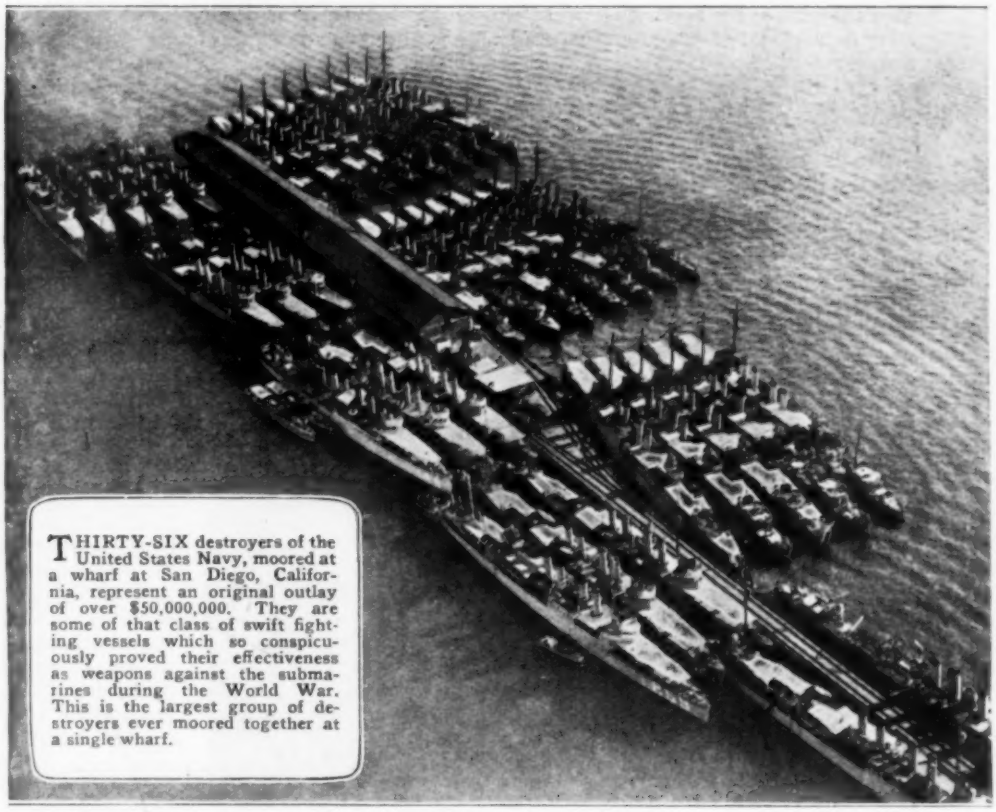
Thus, absolutely precise data will be obtained of what happens to these foundation piers after a prolonged test of three times the allowable load, and it is expected that it will be proved to the satisfaction of the city authorities that double the allowable load can be put upon the foundation piers of the station building, all of which are now in place.

A very interesting feature in connection with these tests is an experiment that is to be made when the bearing value of the hardpan has been determined. It is then intended to sink a shaft beside the pier, and burrow out from beneath its belled base all the supporting hardpan. Observations will then be made of the load supported by the resistance of the skin friction alone between the surface of the pier and the surrounding soil. Such an investigation has never been made before, and the results will be of great value to architects and designers. At the site of the tests, hardpan is at an elevation 25 ft. above bedrock.



Plunger Pump That, with a Pressure of 6,000 Pounds per Square Inch, Lifts the Ram in the Jack When Loaded with 1,000 Tons

THIRTY-SIX DESTROYERS MOORED AT ONE PIER



THIRTY-SIX destroyers of the United States Navy, moored at a wharf at San Diego, California, represent an original outlay of over $50,000,000. They are some of that class of swift fighting vessels which so conspicuously proved their effectiveness as weapons against the submarines during the World War. This is the largest group of destroyers ever moored together at a single wharf.

AMPLIFIER MAKES AUTOMOBILE "SPEAK FOR ITSELF"

Automobile salesmen have found a new and ingenious use for the vacuum-tube amplifier in putting over their slogan, "The Car That Speaks for Itself." A new car, with the slogan displayed on it, is parked at the curb, and the amplifier is hidden in it. A small wire, along the gutter, connects it with a transmitter in another machine, a little distance down the street. The salesmen sit, unobserved, in the second machine and talk into the transmitter. The voice, magnified so that it may be heard for quite a distance, comes from the empty car which seems literally to "speak for itself."

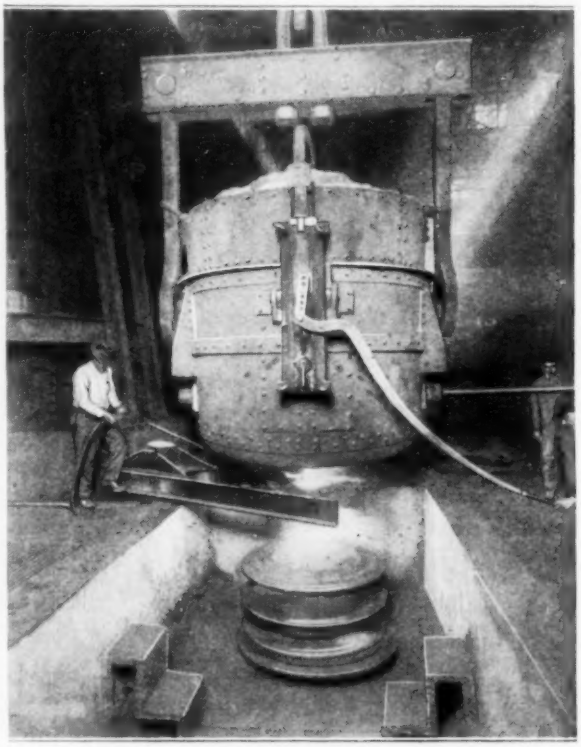
¶ Two thousand five hundred live geese recently arrived in London, Eng., coming all the way from Danzig, Poland. They composed one of the first shipments under the barter trade arrangements which for some time have been in effect between England and Poland.

A Voice, Issuing from an Empty Automobile Standing at the Curb of a City Street, Quickly Draws a Curious Crowd Which Sees and Hears Nothing but the Machine Apparently Explaining Its Own Excellence

STEEL CAR WHEELS MADE IN REVOLVING MOLD

The manufacture of steel car wheels has grown to very large proportions, and there are now several kinds of such wheels in use on American railroads. Demand for these wheels, as distinguished from the chilled-iron wheel, has been increased by the use of the heavier steel passenger and other cars.

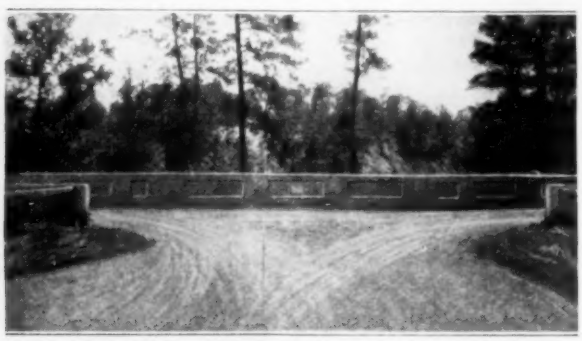
One of the most novel and interesting steel car wheels now being produced is a cast-steel wheel as distinguished from a solid or forged-steel wheel, and is poured in a revolving mold. The object of this is to throw the steel by centrifugal action to the outside of the mold, where it will chill first and form the outside, or rim, of the wheel. An important feature of this process is the injection into the steel of powdered manganese in the early stages of the pouring. The addition of manganese makes the steel much harder—it really forms manganese steel in the rim of the wheel. As the mold fills up, the introduction of manganese is gradually diminished and stopped, so that the central part of the wheel is plain steel, or steel with very little manganese in it. The interesting process is now being commercially exploited on a large scale.



Revolving Mold in Which Steel Car Wheels are Cast: The Man with the Hose, Which is Directed under the Ladle, is Injecting Powdered Manganese into the Molten Metal As It Runs from the Ladle into the Mold

Y-SHAPED THREE-WAY BRIDGE CROSSES TWO STREAMS

Between Fayetteville, N. C., and McColl, S. C., there is a bridge which is unusual in the fact that it is built in the shape of a letter "Y," with roads leading in three directions. At this point two large creeks approach within 10 ft. of each other, but are separated by a solid rock ledge and do not actually come together for more than 15 miles. This 15-mile stretch between the streams is a prosperous section of land and is reached by means of the peculiar bridge, the middle pier of which stands between the two streams. One arch crosses each creek, and a gap at the side admits the road from the district below to the bridge.



The Approaches at the Left and Right Are from McColl and Fayetteville. That in the Foreground is the Road Leading from the District between the Creeks

¶ Names and addresses of manufacturers of articles described in this magazine will be furnished free by our Bureau of Information.

COMMENT AND REVIEW

[These pages were printed November 22, 1921.]

Armistice Day

TODAY is Armistice Day. As I write, traffic throughout Chicago and other cities is at a standstill for one minute; whistles are blowing; bells are ringing; the people are reverently, silently, facing toward the East, where lie so many of our brave young men on the fields of France. Three years have passed since the conflict ceased. Children, on that day too young to comprehend what it all was, are today old enough to understand. In only six years more the boys will be old enough to fight.

Will they have to?

Is it necessary that they should?

Time lays such a subtle, comfortable blanket of forgetfulness upon us all, are not we who did understand rapidly drifting into a state of apathy in this matter? Not that those who lost sons or relatives or dear friends can ever forget, but the great majority of our people have not this personal tie. Because the volcano has exhausted itself for a time, and has ceased to pour out its molten death and stifling gases, shall those who escaped return in blind faith that such a cataclysm can never repeat itself?

In our own interest, and that of world-wide humanity, let us lend our voice and influence to every possible means which leads to ultimate international peace; and as each must sacrifice something if this result is secured, let us, with willing hearts, not hesitate to make ours.

The Conference

NOT since the conference of the far-journeying shepherds to the manger cradle in Bethlehem has there assembled a gathering of as momentous portent as that now in session at Washington. Secretary Hughes' unheard-of diplomacy in presenting, at the very start, something concrete on which to work at once, was a master stroke which will live in history as a most brilliant example of statesmanship. The response from the delegations, to whom the proposal came with a suddenness which was breath-taking, was both prompt and hearty and full of promise. Events in the conference are apparently moving with progress most unusual in a gathering of this kind. Nothing more cruel or wicked can be conceived than that anyone should utter one single word which might cause distrust or hesitation, or give personal offense to any of our visiting delegates from beyond the seas.

Our War Bill

IT MAY seem a bit sordid to make reference to what war is costing us, you and me, today, in dollars and cents. Yet it need not be concealed. Of all the Federal taxes we pay, 93 per cent is going to pay for wars past and future. Our people surely do not realize this enormous drain, but if the war tax could only be separated, and every time a man paid his taxes he paid in at one window $7 for all other purposes of government, and then was obliged to step to another window marked "War Tax" and pay his $93, he would wake up and cry in real distress, "For God's sake disarm."

Setback for Jingoes

CHARLES SCHWAB, one of the greatest steel men of all times, deserves his reputation for sincerity. The thousands of his own men, the thousands of friends—those who know him best—believe him most. It is therefore a shock to certain jingo pacifists, who so loudly shout "Wars are made and fostered by the steel interests for purposes of selfish gain," to have a man like Mr. Schwab wipe out their entire claim with one pungent sentence. Before the American Iron and Steel Institute, and in the presence of Marshal Foch, he made the public declaration. After establishing the fact that his company, the Bethlehem Steel Corporation, is the largest war-material manufacturing works in the world, and has therefore more to lose in the shape of steel shipbuilding yards, costly machinery, etc., than any other, he said: "If the statesmen now assembled in Washington find it possible to bring about disarmament and permanent peace I will gladly see the war-making machin-

ery of the Bethlehem Steel Corporation sunk to the bottom of the ocean. Such a thing as financial loss can be of no consideration when compared to the inestimable boon to mankind which would be involved in the realization of that magnificent plan."

WHILE certain interests have managed to secure the defeat in Congress of a proposed sales tax of one per cent on money actually collected, the measure is one which is undoubtedly destined eventually to be adopted. It has failed at this time because public sentiment was not sufficiently roused to its support. Public sentiment failed in its support because it is either uninformed or misinformed. When once the public comes to really understand this plan of taxation, it will rise and insist upon its adoption. Under its operation goods can be made and sold more cheaply, and this without any necessary reduction in what is paid for labor. Where the purchaser of goods over a counter has been paying 23 per cent extra to anticipate an excess profits tax, the sales tax imposes at most an average of about 3 per cent all told, from raw material to delivery wagon. It is so simple to estimate and collect, millions will be saved in determining and collecting the amount due. At the end of each month, or 12 months, each taxpayer will have a clean slate with the Revenue Department, and will not be called on to pay large sums, which as now, the Revenue Department, by means of new rulings, declares should have been paid five or six years ago, but which it declared at the time was not reportable or collectable. The annoyance, exasperation, and humiliation which are daily inflicted upon countless honest men could no longer occur. Business of all kinds would immediately know "where it was at," and would respond. With the proposed exemption of $6,000 a year, the man of small business would pay less than now, and large interests would have no complaint at what they had to pay.

The Sales Tax

It must be admitted that a sales tax would require a good many thousand less inspectors, investigators, expert accountants, and clerks than now, for practically any boy or girl in the eighth grade could make up the report for a large corporation in a few minutes. It is natural that politicians with patronage to dispense to relatives, friends, and helpers, should oppose any measure which so largely deprives them of their perquisites. As the country weekly used to say, they "view with alarm" such a possibility. That, however, is politics, not patriotism. The time is coming when these same politicians in Congress will see something besides the sales tax to view with alarm, when they come home to tell their constituent voters about the glories of the Grand Old Flag.

DOUBTLESS, as an outgrowth of the war, when national expenditures grew from thousands into millions, and from millions into billions, a spirit of extravagance seems to have been engendered. To the men in Congress apparently anything counted in less than millions appears small and trivial.

Stop Federal Aid

Of the new national expenditures the good-roads appropriation, divided among the several states, seems to be the most practical and satisfactory. National highways have been every country's vital necessity for centuries. With thousands of miles of steam railway extending to every corner, the United States has for 75 years been able to get along without building government roads. With the advent of the automobile, however, city and country are now agreed on state and government coöperation in road building. All parts of the country are undoubtedly in better accord on this one question than on almost any other large national expenditure.

That roast beef and pie may properly constitute two items of a good dinner is no reason for making an entire menu of either. Under Federal aid to states the government says, "Here is a fund, if you put an equal amount with it." This means an increase in taxes payable to the state, and also the state's part—and even proportionately more—of a like amount which its citizens must pay the government. Naturally the states with smaller properties to be taxed pay less than their ratio in proportion to many of the rest. In other words, certain states are thus overtaxed to help other states. This is manifestly unfair.

By literature and billboards the government constantly urges thrift and economy, but the principle of Federal aid to states works the opposite result. The

various interests which are to fatten on the vast sums spent, naturally use every effort to secure favorable action by Congress, and are organized for the purpose.

At the present moment there are pending in Congress bills for appropriating $169,000,000 for additional state aid. This amounts to an extra tax of $5 per average family, which, with the extra state tax, amounts to $10 per family per year, and it is estimated this will have reached $100 per family in 10 years, if contemplated plans are allowed to get a start.

It is always helpful to know how the same thing worked with other people. In 1843, the British national grants for aid were £244,000 (about $1,200,000); this has grown to £65,000,000 today, or nearly $300,000,000. As far back as 1885, Gladstone urged "a discontinuance of the system, as a burden upon labor and industry." He found, as we will, the system is a bribe to extravagance, abetted and subtly encouraged by an organized lobby and propaganda by those few who would personally benefit financially. The profiteering scoundrels of the late war would be multiplied and continued indefinitely.

All but those who expect to share in the rake-off are urged to write their senators and congressmen immediately and say, "We will not stand it."

Idle Mines Tell Sad Story

WITH millions of the food producers starving in Russia, deprived of their live stock, and lacking even seed for planting, little surprise is occasioned at the report which shows the mining industry also paralyzed and almost extinguished. Where in the first six months of 1913 there were mined 9,000,000 tons of iron, in six months of 1921 this had dropped to 100,000 tons; copper fell from 1,000,000 to 4,400 tons, and manganese from 1,280,000 to 3,600 tons. The dark story pictures not so much the thousands of unemployed miners, but thousands of artisans which Bolshevism has slain or scattered, and hundreds of industrial plants either destroyed or partly wrecked and closed. What is true of the farms and factories is equally so of all other lines of productive activity and business.

Aside from the natural sympathies which go out to starving men, women, and children, the world owes a debt to these helpless unfortunates whom fate has seized as the unhappy background on which to project, where all may see, the terrible results of the bolshevistic dream of a government which tried to reverse the processes of natural laws which commenced on this earth with the creation of man. From the day the attempt was made to the present moment, the path of the Russian people has been over the dead bodies of their countrymen along an ever-descending path into an awful living hell. The object lesson has been tragic to the last degree, and would have been impossible of so long endurance in any country where a free press was permitted to reach a people who could read.

Motor Hotels

WITH good roads increasing in every state, and long sections being linked up to make through routes, long-distance travel by motor has already assumed large proportions and is growing each year. The past summer, cars carrying licenses of Texas and other southern states, from the central West as far distant as the Rocky Mountains, and even from the Puget Sound country, thronged New England and Quebec. In winter, Florida is filled with cars from points as far distant as Maine and Colorado and all the states between.

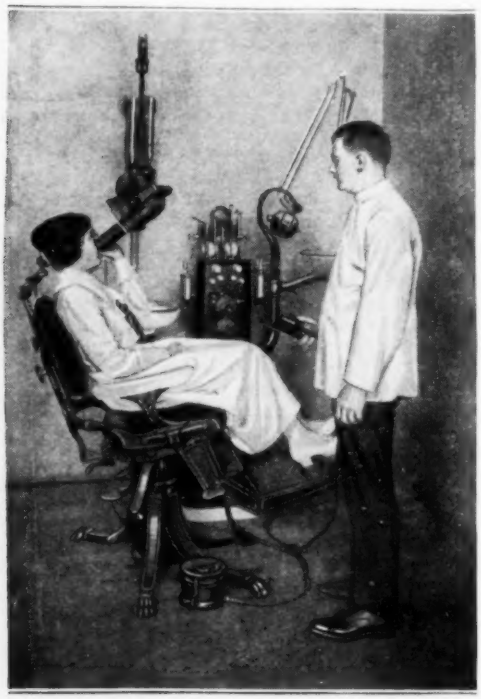
With the great increase in the number of these motor travelers, it is inevitable that a corresponding increase in the number of those who desire to travel in greater comfort than at present must also result. To provide larger sleeping quarters, hot and cold water, baths, a living room, kitchen, and other conveniences, necessarily calls for larger and heavier car bodies. To accomplish this, already motor trucks with special springs have been used to carry these small one-story houses. A wealthy Frenchman has used an army truck for the purpose, and in this country trucks are being used in the same way. As the roads reduce their grades and take on a smoother surface, these combined sleeping and observation railless cars will increase.

The great majority, however, of middle-aged and younger people will not exchange their tent, cot, and sunset supper around a campfire by the side of a brook, for all the fresco-painted, satin-lined, plate-glassed movable mansions which all the trucks in the country can carry.

H. H. WINDSOR

MIDGET X-RAY APPARATUS IS IMMERSED IN OIL

An important advance in the development of X-ray apparatus has lately been announced by Dr. W. D. Coolidge, of the General Electric Company's research



Using the Midget X-Ray Apparatus for Dental Work: The Patient is Seen Holding the Focusing Cone to Her Face to Concentrate the Rays

laboratory, pertaining to the absolute elimination of all danger from contact with the apparatus. The safety feature is accomplished by inclosing the tube, high-voltage transformer, and stabilizer, within a small oil-filled metallic case, which weighs but 20 lb. Heretofore the smallest X-ray machine weighed 150 lb., and consisted of four units. This new midget was built to give the world a tiny X-ray machine, and to eliminate the possibility of electric shock.

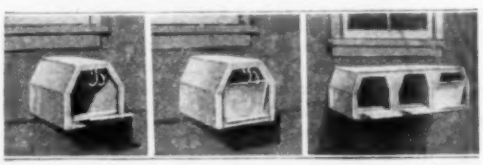
Physicians or dentists can now carry the X-ray machine to the bedside of the patient, for the purpose of radiographic work, as it fits into a small case no larger than the common portable typewriters require. For office use, it can be hung on a bracket arrangement. This new development is made in two units of 40,000 volts and 10 milliamperes, and 60,000 volts and 50 milliamperes. The tube is the smallest ever produced.

EXPEDITION AIMS TO SCALE HIGHEST PEAK ON EARTH

During the last few months the first stage of the attempt to scale the peak of Mount Everest, 29,002 ft. above sea level, the highest summit on the earth, has been completed. This was the exploration and charting of the region of the mountain in the heart of the desolate Himalayas. The work was done by the Everest expedition, consisting of a small party of Englishmen, under the leadership of Col. Howard Bury, all trained mountain climbers. They were accompanied by many Chinese coolies and burden-bearing yaks, beasts that can live on scant herbage. After several months of exploration around the summit, carried out from different bases simultaneously by splitting up the party into groups, finally, at an elevation of 23,000 ft., the only way open to the summit was found in the northeast quarter of the surrounding zone. At other points there were found such obstacles as precipices towering 10,000 ft. above a huge glacier confronting the would-be climber, impassable gorges making the summit inaccessible. The most formidable task of the undertaking will be the ascent of the last 4,000 or 5,000 ft. of the summit, and this is left for the second stage of the undertaking.

LAYING HENS ARE TRAPPED WITH AUTOMATIC NEST

An Iowa poultry raiser has constructed a nest, which has many good features, for the purpose of trapping laying hens. The nest is made of galvanized-iron sheeting, and is of the proper size to accommodate one hen. The laying surface is made of heavy canvas, which is stretched across the bottom and fastened to a hinged trap-door. When the hen enters the nest, her weight upon the canvas automatically pulls the door shut, and a hook arrangement holds the door closed until some



Left: The Trap Nest Empty. Center: As It Appears After the Hen has Locked Herself Inside. Right: Three Nests under One Roof

one releases the fowl. Thus the poultry raiser can get any information desired concerning the laying habits of his flock.

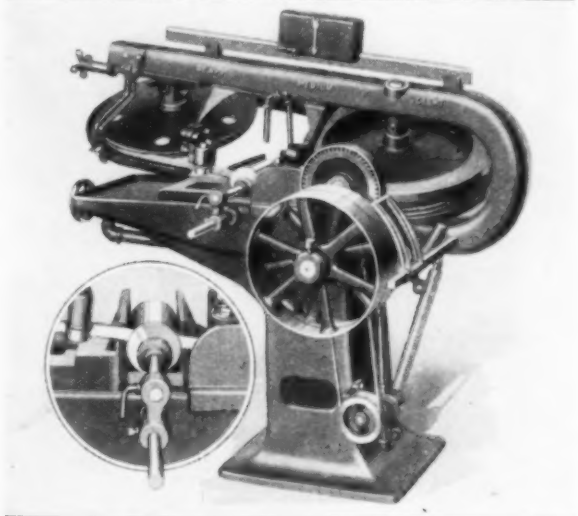
WIDE WORLD PHOTOS

FIRST ROYAL AIRPLANE BUILT FOR KING ALBERT OF BELGIUM

THIS airplane, specially built for King Albert of Belgium and bearing the king's crowned monogram on the side of the fuselage, is the first plane ever built for the use of a monarch. The Belgian King has shown a great interest in flying, and it has become a common thing for him to make trips by airplane, often flying to London and Paris. The picture was taken in Paris, as King Albert, dressed in the complete outfit of an airman, was about to take off for a return trip to Brussels, in his own machine, a two-seater biplane.

METAL CUTTER HAS HORIZONTAL BAND SAW

For small capacities, not exceeding work of 4 by 4 in., a compact metal-cutting machine of the band-saw type, with the production possibilities of much larger machines, has been placed on the market recently. The band saw moves horizontally, protected by an automatic self-adjusting gravity feed which assures even cutting, regardless of varying degrees in the hardness of the metal. It is equipped with roller guides for the band saw, to insure straight cutting and freedom from vibration. The tension of the band saw is regulated by a hand adjustment on the supporting head. There is a belt-driven rotary pump, of the gear type, for wet cutting. As the cutting is done with a band saw, an exceptionally small amount of material is wasted in each cut. The machine is already in extensive use.



Machine That Cuts Metal with a Horizontal Band Saw, Driven by the Pulley in Front: At 250 Revolutions, the Cutting Speed Is 120 Feet a Minute. Insert: Part of the Table, Showing How Work is Held While being Cut

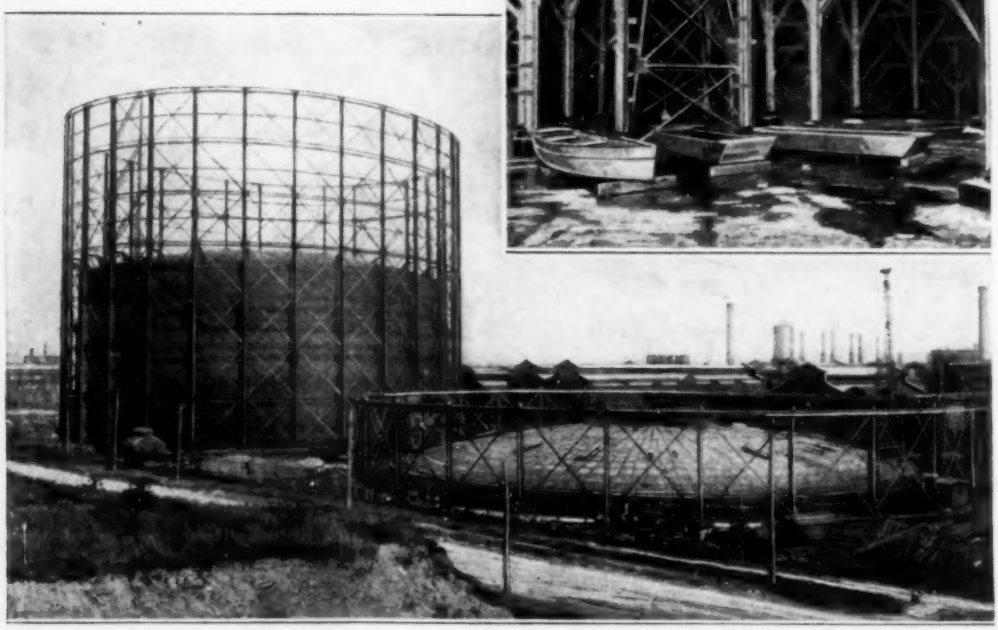
COLOSSAL GAS TANK HOLDS 15,000,000 CUBIC FEET

Huge things are hard to picture in the mind, and a colossal gas tank erected recently on Long Island, N. Y., comes under this head. The mammoth container has a capacity of 15,000,000 cu. ft. of gas and is the second to be completed of a contemplated plant of six such units. The enormous cylindrical sections, which rise and fall so easily with the pressure of the gas, and of which there are five, are each 48 ft. high, 300 ft. in diameter (or the length of a city block), are made of 5/32-in. steel plate, and fastened together with 2,500,000 rivets. The retaining wall at the base of the tank, which holds the water required to prevent the gas from leaking out, is 9 ft. thick at the bottom, has a height of 48 ft., and tapers to a width of 5 ft. at the top. Inside of this monstrous circular wall are confined 14,200,000 gal. of water, enough to make a good-sized lake. The gas-intake and outlet pipes are 4 ft. in diameter, and there are two for each purpose.

To the casual observer, it would appear as though, in a tank of this immense size, the raising and lowering of its sections would be very difficult because of their weight. On the contrary, the crown, or top, which weighs 4,000 tons, is very light in proportion to the lifting surface of 60,000 sq. ft. that is exposed to the gas. Any pressure of gas greater than 5/8 lb. to the square inch will raise the top. The wooden framework built to hold the crown during construction, was left inside the tank to support the top when the tank is not inflated. Three small boats were also put inside the great container to stay away from the light of day, for the use of workmen in making any repairs needed within the spacious steel walls.

FOREST-EXPERIMENT STATION IS ESTABLISHED IN SOUTH

Recently, a forest-experiment station was established by the Forest Service of the U. S. Department of Agriculture, with headquarters at New Orleans, La. Experiments will be conducted in the vast timber region extending from the Atlantic coast, through the southern states, to Texas. The object of the undertaking is to work out the best methods of growing and protecting the forests, thus insuring their perpetuation.



At the Right can be Seen the Mammoth Gas Holder in Process of Construction Which will Make It a Duplicate of the Completed, and Partially Inflated, Tank at the Left The Insert Shows the Boats That were Placed Inside of the Steel Walls and Which will Remain There Forever, to be Used by the Repairmen

Industrial Rehabilitation of Workers

By Wm. A. McGarry

This Young Man Lost His Leg When a Sand Barge Crushed It against a Wharf but, with the Aid of the Pennsylvania Rehabilitation Bureau, He has Been Able to Get Back into Baseball as an Amateur Pitcher and has Secured the Job He had Always Wanted, in Which He Earns a Good Living. The Bureau has Made Him Independent

WHEN he was 18 years old, Joseph Meehan lost his right leg. He was working on a sand wharf and the leg was so badly crushed against the wharf by a barge that it had to be amputated below the knee. That was four years ago, and it looked as though his days as an amateur baseball star were over, but in the season of 1920 he pitched 12 games and won 10 for the team of which he is manager, and in 1921 he has made a still better record. But more important than his return to baseball is the fact that he is now earning a good living as a barber—the job he had always wanted—instead of being a cripple, dependent on relatives or charity.

The story of young Meehan's return to industry is typical of the work which is being done by the Bureau of Rehabilitation of the Pennsylvania Department of Labor and Industry, by which he was assisted. The record of that bureau, opened Jan. 1, 1920, is the story of how Pennsylvania discovered the dollar value of the individual producer, a story of deep significance to industrial America. In fairness to that state, it must be said that the bureau was not established for gain. It was strictly a social movement, an effort to repair, in part, the wreckage caused by the hundreds of thousands of industrial accidents which occur every year. But its investment return is clearly shown by the report of the first year's operation, by S. S. Riddle, the head of the bureau.

A Wooden Leg, and the Bureau Made a Yard Engineer of This Former Handy Man

An appropriation of $100,000 was made to cover operating expenses for something more than a year. Statistics show that the average production of industrial workers in Pennsylvania for 1919 was about $5,000. At the end of its first year the bureau had trained, or was training, 310 out of 750 men and women disabled in industrial accidents. Though some of these workers will never reach normal production capacity again, a conservative estimate gives them a capacity of $1,000 a year, 20 per cent of the normal. This will increase production, the wealth of the state, by $320,000 a year, a return of more than 300 per cent annually on the original investment.

But the really surprising thing, and one which suggests great possibilities of development, is that in scores of cases the rehabilitation experiment has made men worth more. Men considered permanent burdens on relatives or society, and incapable of ever returning to work, are now earning far more than they were ever able to earn before.

One man, who is now an engineer, had been a sort of handy man for a large corporation. He lost a leg in an accident while at work. Before he left the hospital, a representative of the bureau had learned his story and obtained a line on his experience. An artificial leg was

A Blind Piano Tuner and a One-Armed Blacksmith Are Two of the Men That have been Enabled to Learn New Vocations and Renew Their Earning Power after having been Forced Out of Their Former Industrial Activities through Accidents

waiting for him when he recovered, and, after consultation between the bureau and officials of the corporation, the latter agreed to give him a job as an engineer of a yard locomotive after a short period of training. He already knew the yards and was familiar with the work of the yard engine. He went back to work in a more responsible position and at greater pay than he had ever had.

In the act creating the bureau it is stated that, "rehabilitation shall mean the rendering of a physically handicapped person fit to engage in a remunerative occupation." It provides that when an injured person is unable to meet the expense of living, the bureau shall allow him a maximum of $15 a week for maintenance during training for an occupation within his possibilities.

"The aim of our program is to render workers, disabled in industrial and agricultural pursuits, capable of earning a living at tasks they can perform without undue hazard," says the report, "work where advancement is possible; where their disabilities will not render them likely to lose their employment in event of a great supply of able-bodied labor; preferably at tasks for which they have a special aptitude or past experience."

After being Blinded, This Man, Aided by the Bureau, Learned Typewriting and Piano Tuning. He Plans to Open a Musical-Instrument Store

From this it can be seen that the program is an individual affair. It applies to "any resident or residents of the commonwealth whose capacity to earn a living is in any way destroyed or impaired through industrial accident occurring in the commonwealth." There is no "red tape." The injured person is not compelled to apply for aid; the bureau goes to him. The law now provides that all industrial accidents be reported daily to the Bureau of Workmen's Compensation, and from there all records of permanent disability go to the Rehabilitation Bureau. While the victim is still in the hospital, he gets a questionnaire asking for information

that will enable the bureau to decide just how it can be of help to him. When this is returned—and experience shows that it is nearly always returned—an adjuster visits the man in the hospital. He finds out not only what the patient can do but what he wants to do. The point of the training given by the bureau is often found in these desires.

Many of the men have secretly wished to be "something better" while working at hard labor or menial tasks, but have never found the chance to change. Then, in the despair of misfortune and the belief that their usefulness is ended, they admit they would like to do something different. The bureau arranges to have an examination made, often by competent psychologists. It learns whether it would be worth while to provide the training which would be needed.

In one case a young man, 20 years old, lost his arm. He told the adjuster that for a long time he had wanted to be a wireless operator. He was the sole support of his widowed mother, so arrangements were made for a lump-sum payment of his compensation award. With that he was able to start a small candy and cigar store which provided sufficient income for the two. The young man then joined an evening class, under the direction of the bureau, to study wireless telegraphy.

The success of the bureau's activity is undoubtedly due to the fact that it operates as an aid which the state owes to the injured person, not as a charity. Again and again it has awakened the desire to work in men who had become despairingly reconciled to a life of uselessness. Once these men are shown that they can be of service, they are always enthusiastic and willing to do any amount of studying to attain that end.

A Hand Loom in His Home, Provided by the Rehabilitation Bureau, Enables This Blinded Man to Support His Family

Training in the Evening Class, under the Bureau of Rehabilitation, to Achieve His Ambition to Become a Wireless Operator

How this work operates for the benefit of the state is illustrated by the case of a Polish laborer who lost his right hand. The bureau provided him with a new hand, sent him to an Americanization class and procured for him a job as a hospital orderly. It was arranged to have his wife come on from her native land to join him, and finally he was put into position to rent a farm, where his past experience made him a valuable citizen.

Fully to appreciate what this kind of service means, it may be well to point out that the 310 persons assisted last year were supporting 454 dependents. A total of 166 obtained artificial appliances through the bureau, the cost being paid out of the state fund in some instances. At the end of the year, 47 were still receiving regular weekly maintenance, while studying such courses as telegraphy, motor mechanics, traffic management,

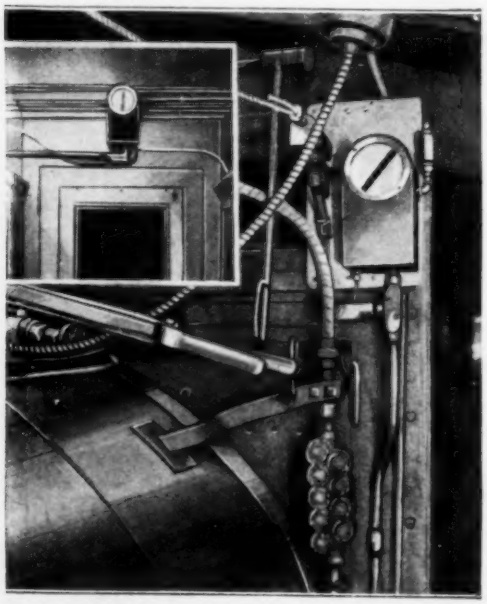
salesmanship, commercial courses, including cost analysis and accounting; Braille reading and writing, piano tuning and carpet weaving, for the blind; mechanical drawing and machine design, a teachers' course in the state normal school, watchmaking, and other skilled occupations. The rest of the men had become self-supporting.

All the work done has been accomplished by the state alone. Federal funds, made available by the Industrial Rehabilitation Act of June 2, 1920, have not been utilized up to this time. When they are, it will mean an expansion of the work. The bureau has branch offices in several cities of the state, and sends out circulars to get in touch with disabled men through labor unions and other organizations, in order that no one entitled to its services may be overlooked.

"As industrial plants have, in the past, maintained salvage departments for the elimination of needless waste of mechanical equipment, and studied the development of by-products until their value in some cases exceeds the value of the original product," says Mr. Riddle, "so must attention today be given to the human by-products of hazardous industrial processes. It is essentially a problem of human engineering."

ELECTRIC SIGNAL FOR EITHER FREIGHT OR PASSENGER TRAIN

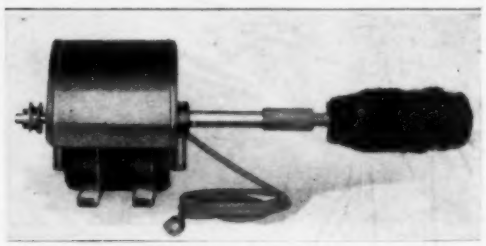
An electric train signal that has many advantages over the existing system, and that can be applied to freight as well as passenger trains, has been under test for more than a year on a train making a daily run in New York and Vermont. In each coach of a passenger train, and in the cab of the locomotive, a signaling instrument is installed so that it is plainly visible. It is in the form of a small metal case with a framed dial on which is pivoted a miniature semaphore that swings from a vertical to a horizontal or sloping position to indicate danger, like the ordinary outside signaling semaphores. Attached to the case in each coach is a small hissing device, and to the instrument in the locomotive cab a loud whistle, all of which are operated by the brake air. The operation of these signals depends upon an electric circuit, the interruption of which causes instantaneously the blowing of the whistle, and the swinging of the semaphores in every instrument. Small batteries are required on freight trains, but would not be needed on electrically lighted cars. The wiring is connected between the cars by means of an insulated-wire coupling in the brake hose, thus making necessary only two hose couplings instead of three on passenger trains. An interruption of the electric circuit can be caused at will, and is caused automatically by any accident.



New Electric Train Signal Shown Installed on the Cab of a Locomotive, and in the Inset, on a Somewhat Smaller Scale, Shown in a Passenger Coach

BOTTLES AND GLASSES WASHED BY USING BRUSH AND MOTOR

An electric bottle washer is available, which consists of a brush mounted on a handle attached to the shaft of a ⅛-hp. motor. The device is placed so that the brush extends over a tub of water in which the bottles are placed. These are

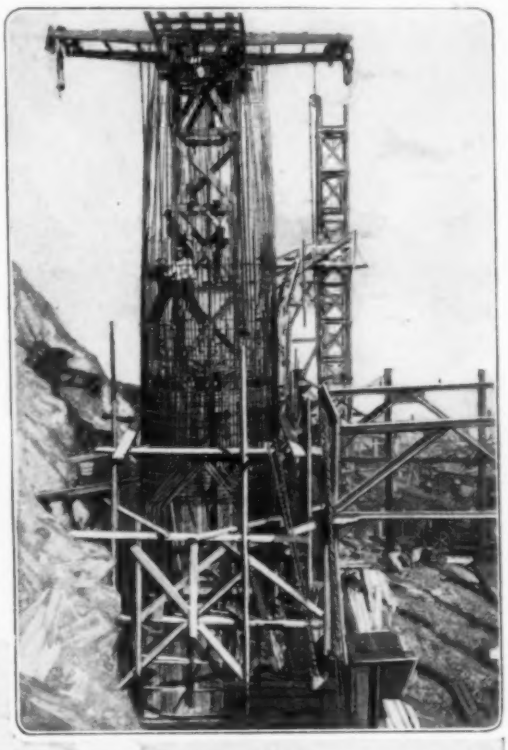


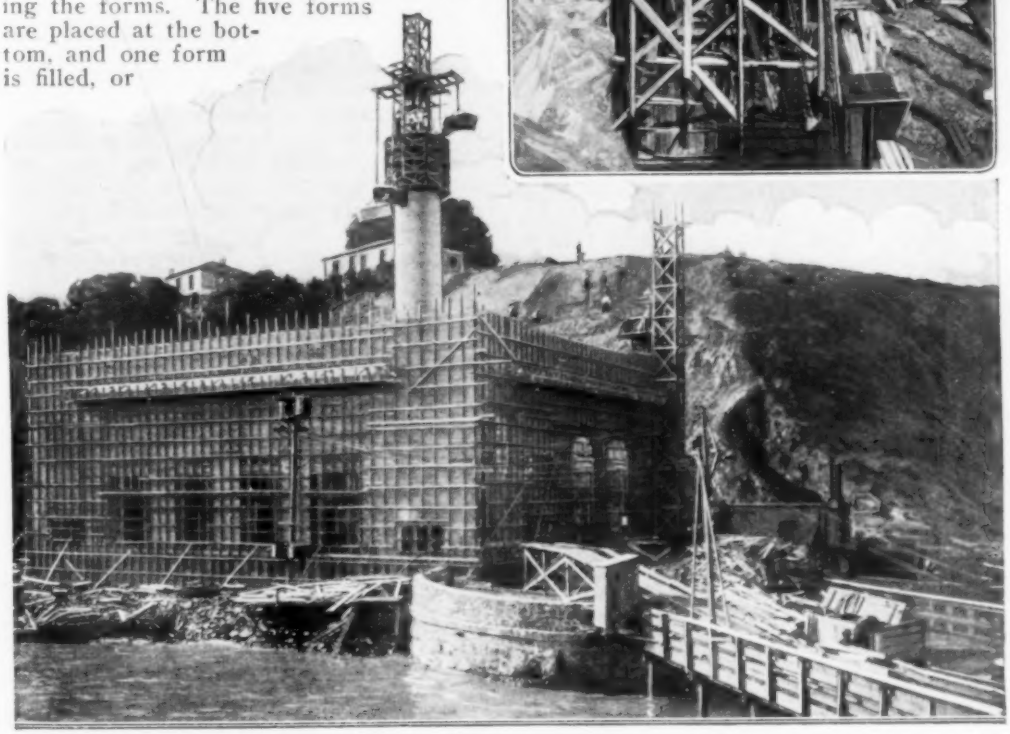
The Electric Bottle Washer, Showing the Motor with Long-Handled Brush: The Cord Attachment can Also be Seen

half filled with water, and pushed over the swiftly rotating brush. After cleaning, the water is poured out and the brush then acts as a drier. The motor shaft can be fitted with different-sized brushes, or with wheels to be used as buffers for silverware or other household utensils.

CONCRETE CHIMNEYS ERECTED WITH GREAT RAPIDITY

Speed in construction is always considered a great asset, and a new way of building concrete chimneys certainly comes under this head. Concrete, as is generally known, requires a certain length of time after being poured to become hard, or set as it is called, and on work of this nature there is always a necessary wait before the form, or mold, is removed. To overcome this delay, a contractor has used five forms instead of one, each form being divided into four parts. When a chimney is to be erected, a wooden tower is first built, in what will be the center of the stack. This tower supports four sets of block and tackle at the top, for the purpose of hoisting the forms. The five forms are placed at the bottom, and one form is filled, or poured, every day. On the fifth day, the lower form is hoisted to the top of the others, and again filled. Each day, thereafter, a form is raised, so that the work is never halted, and yet each form has four days in which to set, or harden.





A Concrete Chimney during Construction, with the Sections of the Lower Form being Hoisted to the Top Position by Means of a Block-and-Tackle Arrangement Mounted on a Tower in the Center of the Chimney: The Upper View Shows the Method of Placing the Reinforcing Steel

RECORD-LIFTING DISK LATEST PHONOGRAPH CONVENIENCE

For the convenience of phonograph users, an attachment has been invented to lift records from the turntable of the

Above: A Phonograph Turntable with the Lifting Device Raised, Right, and Lowered, Left. Below: Record Lifted from the Turntable by the Device

machine. The center of the turntable is made in the form of a separate disk, which can be raised by pressing a button and plunger. The plunger is connected with the center disk by means of a series of links. This lifts the record so that it is easily removed from the turntable. When using this device, it is not even necessary to stop the machine, as the record can easily be removed while the turntable is rotating.

ELEPHANTS BOARD TRAIN AT PASSENGER STATION

Down the taxi drive of the Grand Central Station, New York City, filed four elephants one night not long ago. The excitement which their appearance created did not disturb the animals in the least. They went directly to their private car on the midnight train for Boston. Ordinarily elephants leaving the city entrain at the freight yards, but this 20-ton quartet, known as Tillie, Tony, Clara, and Pitt, could not complete their engagement at the show in time to make the train in the usual way, so a special arrangement was made for them. Two doorways, 7 ft. high, which had to be passed, caused no difficulty, though Tillie is 12 ft. tall. The animals merely knelt and crawled through without even breaking ranks.

ORDINARY CISTERN FILTERS DO NOT PURIFY WATER

According to the United States Geological Survey most of the filtering methods, used to purify cistern water for drinking purposes, do not remove the disease germs, though they do make the water apparently clear. The most common method is to divide the cistern into two compartments by a brick wall. Water is admitted to one compartment and drawn from the other after it has filtered through the wall. This improves its clearness, but not its sanitary qualities. When properly purified, cistern water can be used for drinking purposes with entire safety.

X-RAY PHOTOS ARE MAGNIFIED WITH NEW DENTAL APPLIANCE

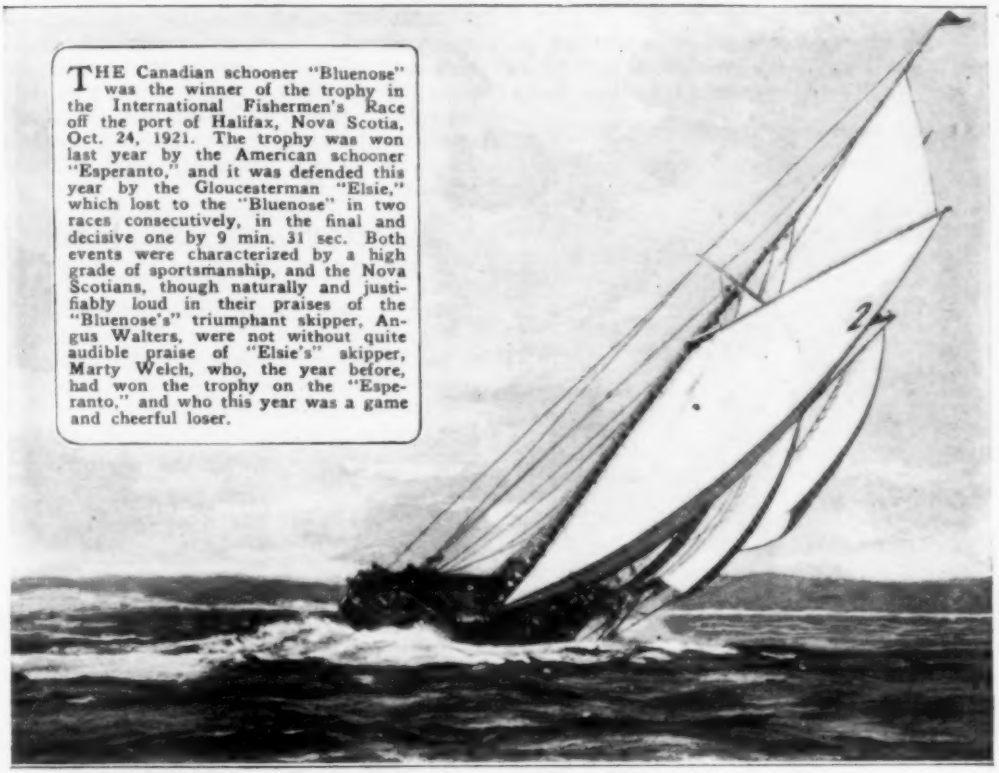
Magnification of the Roentgenographs, or X-ray photos, of the teeth, to the extent of several times, is made possible with the use of a new dental appliance. The magnifier is electrically lighted and can be attached to any light socket in the usual manner. When an X-ray picture of the teeth is taken, it is sometimes impossible to detect with the naked eye the minute abscesses, or pus pockets, which have formed at the roots. Thus

The X-Ray Photo Magnifier, Showing the Photo before being Magnified, at the Left, and at the Right, the Same Photo Magnified

the value of this instrument for dental diagnosis is very apparent, and it should prove a popular aid to this profession. The instrument can be adjusted to the proper focus for any person by means of a small thumbscrew.

CANADA WINS IN GREAT MARINE SPORTING EVENT

THE Canadian schooner "Bluenose" was the winner of the trophy in the International Fishermen's Race off the port of Halifax, Nova Scotia, Oct. 24, 1921. The trophy was won last year by the American schooner "Esperanto," and it was defended this year by the Gloucesterman "Elsie," which lost to the "Bluenose" in two races consecutively, in the final and decisive one by 9 min. 31 sec. Both events were characterized by a high grade of sportsmanship, and the Nova Scotians, though naturally and justifiably loud in their praises of the "Bluenose's" triumphant skipper, Angus Walters, were not without quite audible praise of "Elsie's" skipper, Marty Welch, who, the year before, had won the trophy on the "Esperanto," and who this year was a game and cheerful loser.



COPYRIGHT, UNDERWOOD & UNDERWOOD

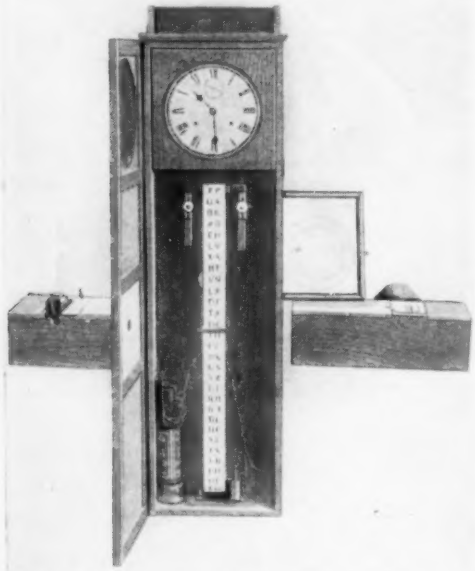
WELDING OUTFIT ON MOTORCYCLE

Operation costs of a welding outfit have been lowered one-half by mounting the apparatus upon a motorcycle with an improvised frame and a third wheel. The improvement is the result of the efforts of a street-railway company to obtain a welding outfit that could be moved from place to place more quickly and at less expense than was possible with the motor truck then in use. The officials of the company declare that the change has proved very beneficial, and could be profitably utilized to do similar welding for any company. The great adaptability of this small, though efficient, equipment in carrying the welding outfit to many places that are inaccessible to a motor truck, is very apparent.

The Motorcycle Welding Outfit, Showing the Method of Carrying the Equipment, the Use of Which Requires a Driver and a Welding Mechanic

SYSTEM OF SYMBOLS USED IN "UNBEATABLE" CLOCK

Time clocks are usually a source of more or less trouble to the employer, because after the clock is installed, some one has to be detailed to watch the employes using it, to detect any false registrations. As a means of preventing the workers from registering for each other, or from covering up "late marks," an Oberlin, Ohio, inventor has produced a new clock. Instead of complicated machinery, he uses a system of symbols, composed of letters, to compel every employe to make a correct report of his arrival or departure. These symbols have a different combination for every two minutes of the 24 hours. By simply pressing a button, the employe has the time and corresponding symbol stamped on his time record, after which he is required to sign his name. It is claimed that the clock can be used to advantage in any line of work, or for automatic roll calls of any description.



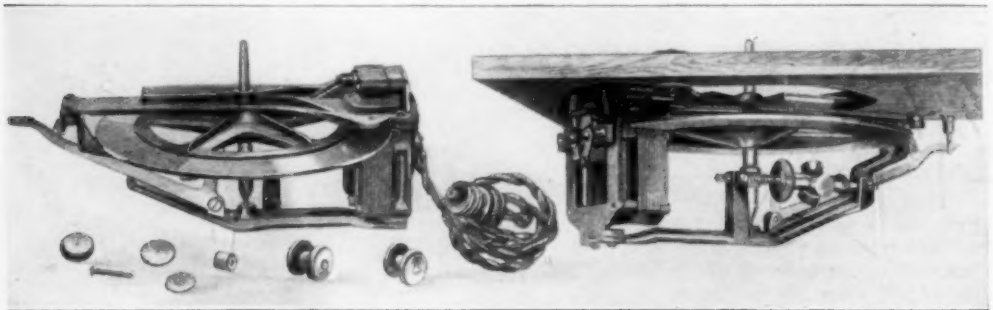
The Time Clock, Showing the Arrangement of Letter Symbols Operated by Electricity. Left Shelf: The "On Time" Register. Right Shelf: The "Late" Register

EARTHQUAKES FROM DEEP REGIONS OF THE EARTH

Earthquake waves may originate at points in the earth a considerable distance below the surface, according to the recent announcement of a scientist who has studied the existing data on the subject, and subjected it to elaborate mathematical analysis. Previously it has been assumed that such disturbances came from so near the surface that the effects of their depth could be neglected in considering problems of earth-wave propagation. It appears that the origin of some waves may be as far below the surface of the earth as one-fifth of its radius, or roughly one thousand miles, and it will be necessary to modify the interpretation which has been placed upon many of the earth's disturbances, and this may exercise an important influence upon our ideas of the stability of the earth and of its past history.

ELECTRIC PHONOGRAPH MOTOR OF SIMPLE CONSTRUCTION

A new phonograph motor of extremely simple construction, and said to possess numerous good qualities, has been built along the lines of the watt-hour meter, which is installed in every electrically lighted home. Only two moving parts are used, thus assuring few breakdowns



Left: The Phonograph Motor, Showing Its Simple Construction and Few Details Needed to Attach It to Any Machine. The Similarity to the Ordinary House Watt-Hour Meter can be Seen in the Flat Copper Ring Which Rotates through a Magnetic Field. Right: The Motor Attached to an Instrument

and a corresponding longer life. The rotating element consists of a copper ring of 9-in. outside diameter and 6-in. inside diameter, having a thickness of approximately ¼ in. This ring revolves through the ordinary electromagnetic field. It is claimed that the motor has a small power consumption due to the way its bearings are placed.

AUTO-GLARE DIMMER TO END DANGER FROM HEADLIGHTS

Laws have failed to end the dangerous glare of auto headlights, but their danger is eliminated by a screen which can be instantly slipped onto the windshield of any machine. It consists of a spring-brass frame holding a very fine-meshed

The Driver does Not Look through the Dimmer, He Looks under It. Its Shadow on His Eyes Protects Them from the Glare. Right: The Dimmer Alone

woven screening of a special-bronze wire. A slide and thumbscrews provide the adjustment for height. When not needed, it is turned up, but can be lowered by a mere touch.

PRIZE AWARDED DISCOVERER OF HARMLESS OPIATE

To enable Prof. David I. Macht, of Johns Hopkins University, Baltimore, Md., to continue his research work on certain synthetic compounds which are successfully replacing opium as sedatives, the American Pharmaceutical Association has awarded him the annual grant of the association's research fund. The compounds, known as "benzyl derivatives," were first tested on animals five years ago, and their use has already saved thousands of convalescents and invalids from becoming possible drug addicts. They are fully as effective as opium derivatives, but do not form a craving or habit, such as may result from the medicinal use of opiates. The new investigations will be of benzyl compounds found in certain vegetable preparations.

ELECTRIC "NIGHTCAPS" USED FOR WARMING COLD HEADS

Bald-headed men can now sleep in comfort, regardless of any chilly blasts of winter which may sweep in through open

Left: How the Cap Appears on the Head. Right: The Inside of the Cap, and the Plug and Cord

windows or along open sleeping porches. The answer to the perplexing problem of cold-headed persons, lies in the production of an electrically heated warming cap. This cap is made in much the same manner as the common warming pads and blankets now on the market, and has the usual plug attachment.

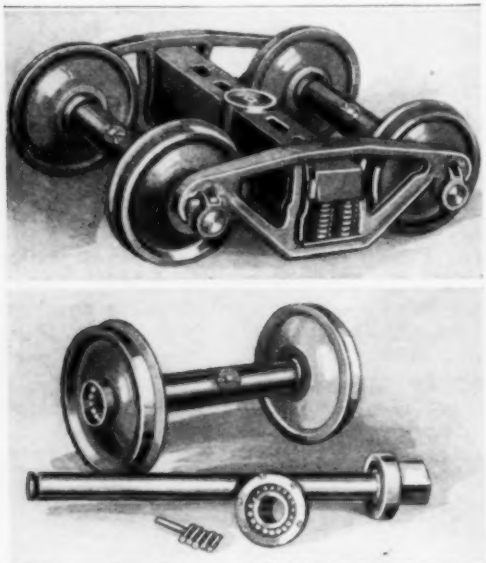
MOTORCYCLE TRANSFORMED INTO AUTO BOBSLED

An auto bobsled which derives its locomotion from a motorcycle engine and has a body line similar to that of a motor car, has been developed by an enterprising Indiana cyclist. The rear wheel of the motorcycle and the engine remain fitted to the cycle frame, and this in turn is fitted to the frame of the bobsled. A standard automobile wheel is used in steering, and the driving wheel is equipped with chains to prevent slipping.

The Engine and Rear Wheel of a Motorcycle, Both Still Attached to the Cycle Frame, Form the Driving Equipment of This Auto Bobsled. The Wheel is Provided with Chains

ROLLER-BEARING AXLES ON RAILROAD CARS

A roller and ball-bearing axle for street and railway cars has been under test now for nearly two years on a railroad car



Railroad-Car Truck with Roller and Ball-Bearing Axles: The Rollers Are between the Axles and the Inclosing Sleeve That is Filled with Lubricating Grease through the Hole at the Center

with, it is said, very satisfactory results. Each journal of the stationary axle is hardened to form the inner race for a series of rollers, the outer race for which is a cylindrical extension of a rotating sleeve that incloses the axle between the wheels, and which is kept full of grease for lubricating both bearings. These rollers are directly in line with the thrust from the load on the wheels, and there is no eccentric stress as in ordinary journal boxes. All side thrust on the axle is taken up by ball bearings, which are outside the axle sleeve and contained in a cap at each end of the axle.

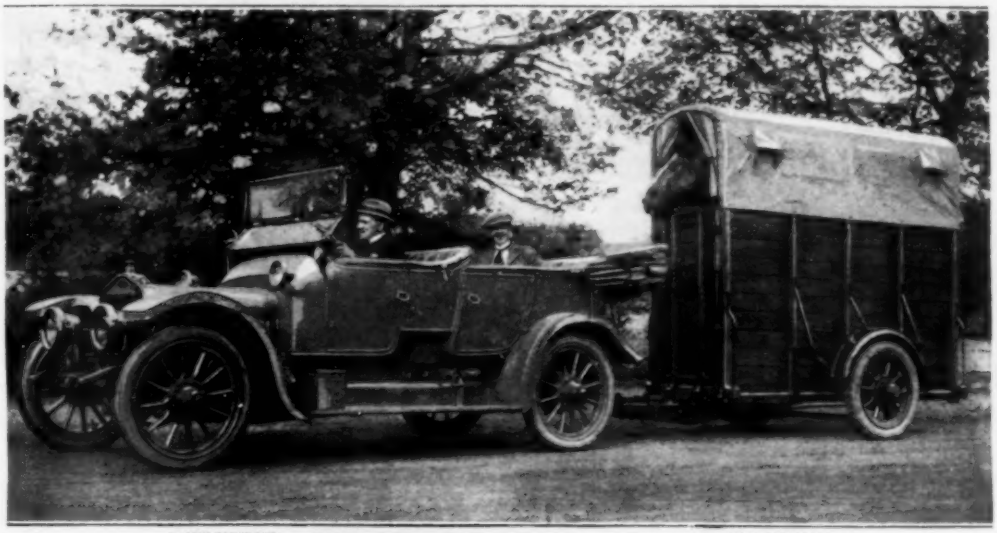
MAKING PHONOGRAPH RECORDS OF ACTUAL GRAND OPERA

Phonograph records of operatic or other singing are now made by requiring the performer, or performers, to sing into a gaping horn, standing just at the right distance, and being painfully careful just how the voice is aimed. When the recording apparatus has once been started no sound can be made by anyone but the singer, and all instructions from the director have to be made by gestures and signs. Thus, besides the unnerving effect of the gaping horn, the singer has to keep his eye on the director, who gesticulates from behind the recorder. This is, to say the least, not exactly a stimulating form of inspiration for the singer. But, on the other hand, could these records be made when a singer is in his, or her, field of glory on the center of the operatic, or concert, stage, facing an admiring audience, surrounded by sympathetic colleagues, how much better would be the result! Plans are now under way to make records in this manner; indeed some have already been made in Chicago, where recently, for several nights, grand-opera performances have been radiophoned, to the inexpressible delight of thousands of wireless amateurs located in districts hundreds of miles away from the Chicago opera house. The records are first made, as usual, on wax master records, and everything is conventional excepting the one prime and highly important fact that the artistic temperament of the performer is not being tampered with. In connection with the enterprise there is, however, one mechanical novelty which has not yet been used in taking these operatic records. This is an entirely new form of listening device, the instrument that receives and transmits the sounds from the stage or auditorium. It is expected that it will make possible a reproduction of music on the phonograph that will surpass anything that has yet been done.

ADJUSTABLE DESK TRAY NEW OFFICE CONVENIENCE

Adjustable desk trays with a mounting which can be either screwed to the desk or clamped on, without marring the surface, are now on the market. The mounting consists of a grooved rod, about which the trays revolve, and the screw plate or clamp. Trays can be adjusted instantly to any position desired or swung entirely out of the way. They are regularly made in units of two, three, and four trays. Each tray can be removed from the rod separately.

AUTO TRAILER DESIGNED TO TRANSPORT HORSES



PHOTOS COPYRIGHT, KADEL & HERBERT

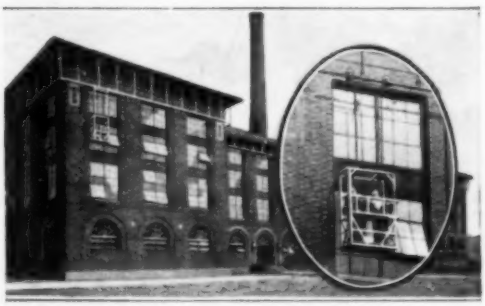
Above: The Horse Trailer Loaded and Coupled to a Motor Car, Ready to Start on a Cross-Country Trip. Note the Ventilators in the Top

Left: The Legs Used to Support the Trailer When Standing are Shown in Use; Also the Coupling Device for Hooking to a Car can be Seen

For the purpose of transporting horses to and from races and horse shows, without the bad effects of railroad travel, an English firm is making a new kind of automobile trailer. It consists of a box body, just large enough for a horse to stand in, mounted on two pneumatic-tired wheels and covered by canvas stretched over a frame. Each end of the box is hinged at the bottom and drops to form a platform by which the horse enters the box. Iron legs, at the ends of the box, are lowered to support it while standing, and are raised when the trailer is coupled to the rear of a motor car for traveling. Ventilation is provided by two openings in each side of the canvas top and through the ends.

TRAM SYSTEM INSTALLED FOR WASHING WINDOWS

Washing the 4,600 window panes of the new Division Street pumping station of the Cleveland, Ohio, waterworks, has been made a safe job which can be done in a comparatively short time, by the installation of a tram system. A rail, around the building just below the roof, supports a light hand-propelled cage which can be raised or lowered by means of two small hand winches. The rail is inconspicuously constructed and does not detract from the appearance of the build-



Just below the Roof Is the Rail from Which the Window-Washing Cage is Hung. The Insert Shows How the Cage is Suspended

ing. Using this system, a great saving is effected in the time and cost of window washing. The tram can also be used for painting the window frames and spouting, replacing broken panes, or making any light exterior repairs.

IMPROVED TRAFFIC TOWERS FOR DETROIT SYSTEM

New and improved traffic-control towers will replace those which are being used in Detroit, Mich. The system, described in Popular Mechanics for June, has been so successful that it will be developed still further. The new towers are more artistic in appearance than the old ones and are equipped with a double set of lights. A telephone system has been added, and megaphones protrude through the floor of the traffic officer's box, by means of which he can give verbal directions whenever it is necessary. These towers will be used to control the traffic for four blocks in each direction, by means of three lights. A green light signals to go ahead, a red to stop, and a yellow one warns that traffic is about to be stopped.

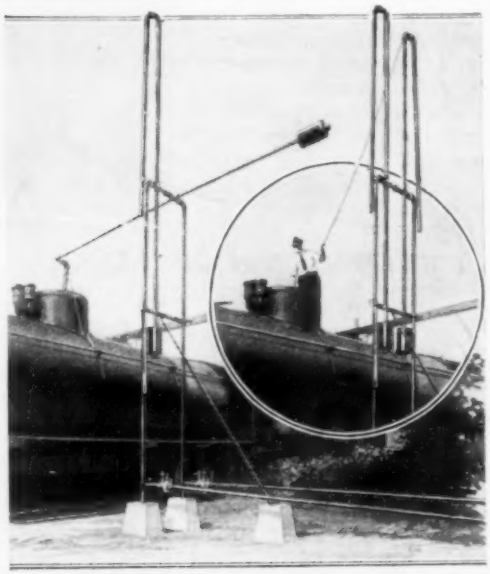
With Traffic Towers like This, It Is Only Necessary to Have a Traffic Officer Every Four Blocks to Get Perfect Traffic Control

VITAMINES UNNECESSARY FOR PLANT GROWTH

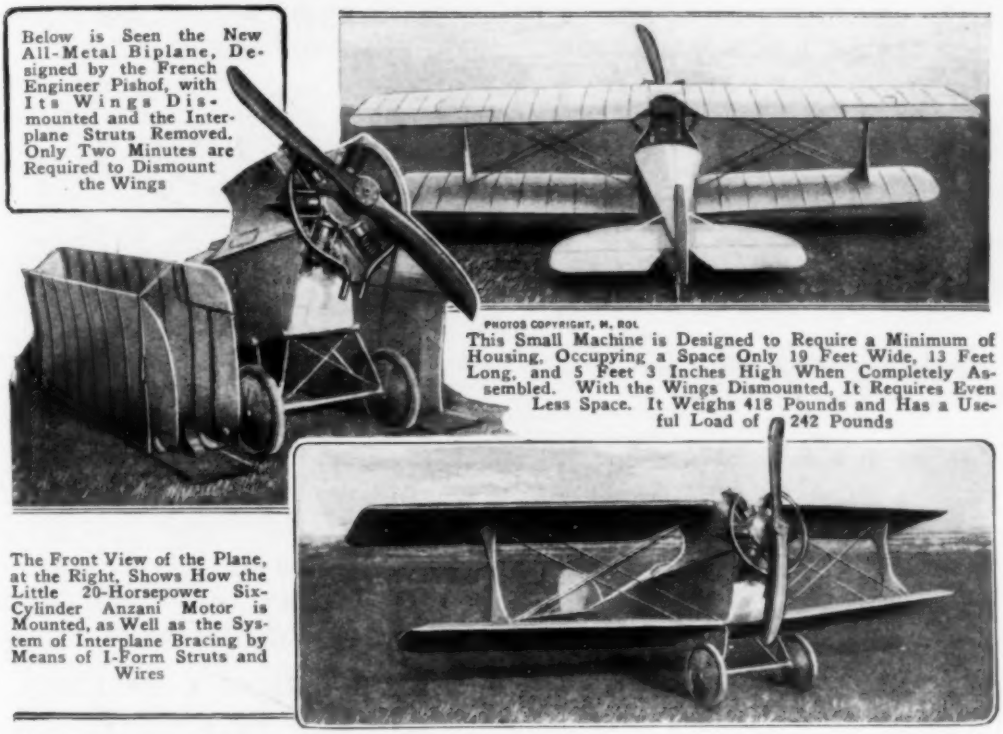
While it appears impossible to maintain animal life without vitamines, they are not necessary for plant growth, according to the report of a French investigator. He found that plants would reach complete growth in media known to be free of vitamines, or which were entirely of mineral composition. On the other hand, vitamines were found to be of assistance in plant growth in some cases where the plant was placed in a soil of low nutritive value, but the vitamines can be replaced perfectly by the addition of appropriate mineral salts.

TANK CARS QUICKLY EMPTIED WITH NEW UNLOADING RACK

Transferring the contents of oil-tank cars to storage reservoirs, has been greatly speeded up by the introduction of a new unloading rack. The rack is constructed of 2-in. steel pipe, and is fitted with universal joints and counterweights, which make the unloading, or tank-feed, pipe, very easy to handle. The entire arrangement is controlled by a chain in the hands of an operator on the tank car, and when not in use, the counterweights cause it to lock automatically, in a vertical position. Thus the rack, when idle, is always clear of the track, which prevents any chance of accidents.



The Unloading Rack as It Appears in Use: Insert Shows the Idle Rack before being Pulled Down



Below is Seen the New All-Metal Biplane, Designed by the French Engineer Pishof, with Its Wings Dismounted and the Interplane Struts Removed. Only Two Minutes are Required to Dismount the Wings

PHOTOS COPYRIGHT, M. ROL

This Small Machine is Designed to Require a Minimum of Housing, Occupying a Space Only 19 Feet Wide, 13 Feet Long, and 5 Feet 3 Inches High When Completely Assembled. With the Wings Dismounted, It Requires Even Less Space. It Weighs 418 Pounds and Has a Useful Load of 242 Pounds

The Front View of the Plane, at the Right, Shows How the Little 20-Horsepower Six-Cylinder Anzani Motor is Mounted, as Well as the System of Interplane Bracing by Means of I-Form Struts and Wires

SMALL FRENCH AIRPLANE HAS DEMOUNTABLE WINGS

Wings which can be demounted in two minutes are the conspicuous feature of the new French airplane, designed by Pishof, in developing a type of plane requiring only a small hangar space. This machine is a biplane with single I-form struts at each side of the fuselage and wire bracing. It has a span of 19 ft., is 13 ft. long, and 5 ft. 3 in. high. The construction is of the all-metal type and a 20-hp. six-cylinder Anzani motor furnishes the power. Empty, the machine weighs 418 lb., and it has a useful load of 242 lb. It is credited with a speed of about 70 miles an hour.

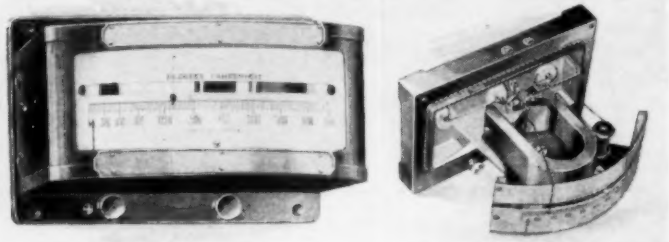
ELECTRIC RANGE HAS SWITCH WITH TWO PILOT LAMPS

Pilot lamps in a main-line switch are a new feature of electric ranges, and one which should be popular with the forgetful housewife who neglects to turn off the current. The main switch box is designed to be mounted in, or on, the wall near the stove, and contains two pilot lamps which are connected across the load side of the switch. A small knob to operate the switch, and red lenses in front of the lamps, are set in the face of the box. When the switch is turned on, the lamps light behind their red reflectors, thus serving as a vivid reminder that the current is being used.

The Woman is Turning the Switch Handle, above Which can be Seen the Two Pilot Lamps Mounted in the Switch-Box Cover

THERMOELECTRIC PYROMETER HAS SELF-COMPENSATION

Pyrometers are used to measure exceedingly high temperatures, such as molten metals, high-pressure steam, etc.



Two Views of the Thermoelectric Pyrometer Which Has Automatic Compensation for Temperature Changes of the Cold Junction: At the Left is Shown an Exterior View of the Instrument, and at the Right the Interior

Thermoelectric pyrometers have two fine wires of different metals, which are fused together at one end and called a couple. This couple is then placed in the heat to be measured. The other ends of the wires are connected through a galvanometer. The difference in temperature between the couple and the outer ends, generates an electromotive force which is approximately proportional to the difference in temperature between the heat measured and the surrounding atmosphere. The cold ends of the couple have to be kept free from any temperature changes. Heretofore they have been brought to a compensating box to insure an even temperature. By using an improved-type instrument, these ends are connected direct, and any temperature change is compensated by an adjustment on the instrument.

FITTING TRIBUTE IS PAID BY AMERICAN LEGION POST

The Jeff Feigl Post of the American Legion has paid a fitting tribute to the man after whom the post is named, and who was the first New York officer to be killed in the late war. A bas-relief portrait, which shows him in uniform, has been made in bronze, and was recently presented to the Victory Hall Association, New York City.

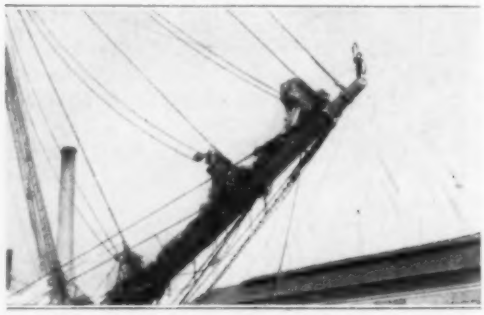
¶ Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished, free, by addressing our Bureau of Information.

STUDIES OF PIPE CORROSION BY BUREAU OF STANDARDS

Underground-pipe systems always suffer more or less rapid deterioration as a result of the corrosive nature of the soil, and much study has been devoted to the problem of overcoming the trouble. Now the Bureau of Standards has taken up the subject and is making investigations, particularly with reference to gas and water mains. Forty locations representing different kinds of soils have been selected, and at each of them samples of standard iron and steel pipes will be buried. These will be uncovered periodically to find the rate of corrosion. When all the necessary data have been obtained, extensive laboratory tests and experiments will be made to discover a remedy.

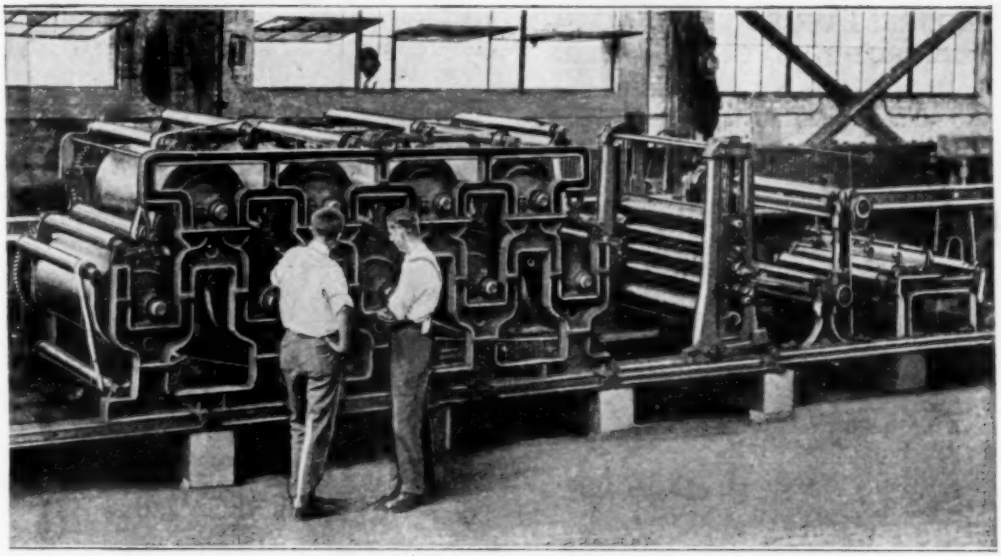
SHIP CARRIES A TRAFFIC OFFICER ON BOWSPRIT

Everyone is familiar with the small figures which often decorate the radiator caps of automobiles, but who ever heard of such a thing on an ocean-going ship? Still when the schooner "William Bowden," with a cargo of lumber from Westport, Ore., reached the port of Honolulu, H. I., one of these tiny figures, a traffic policeman, was seen perched on the end of its bowsprit. Throughout the 30-day trip he had stood there, turning and swinging his arms in response to every wind.



Standing on the Tip of a Schooner's Bowsprit, This Tiny Traffic Officer, with Swinging Arms, Responds to All the Winds of the Pacific

According to the crew, he was kept busy day and night, though the traffic on the Pacific Ocean has never been congested.



Part of the Small Paper Mill Built in This Country for the Siamese Government: It has been Shipped to Bangkok, Where It will be Installed for Experimental Work, as the First Step toward Developing the Paper-Making Industry in That Country, Which Is Exceedingly Rich in Raw Materials

MINIATURE PAPER MILL SAID TO BE MOST COMPLETE BUILT

An American-built paper mill, shipped to the Siamese government for experimental purposes, is one of the most complete mills ever built. Though of small size, being only 56 ft. long, it is equipped for the manufacture of all kinds of writing and printing papers, and is patterned after the experimental mill of the U. S. Bureau of Standards. The shipment includes such essential parts as a Fourdrinier sieve, 43 in. wide and 33 ft. long, two 300-lb. wood-tube beaters, a small engine, a 600-lb. rotary beater, a cylinder duster, screen, sheet cutter, and bleaching plant, besides all fittings and accessories. Both constant and variable-speed shafts are provided. Siam became interested in the use of its abundant raw material through experiments, described in Popular Mechanics for December, made at the suggestion of their ambassador to the United States.

ELECTRIC-VALVE TUBE MADE WITH REVERSIBLE FEATURE

Electric-valve tubes are usually one-way affairs as regards the current flow, but a new tube is available which possesses a reversible feature. The innovation consists of a spherical glass bulb with two cylindrical ends, each containing a short terminal wire. Between the ends is placed an aluminum tube which is insulated from the terminal wires by an air gap. Inside of the tube is a small aluminum ball. By tilting the tube to either side, the ball rolls down to the end, thus making contact with one or the other of the terminal wires by closing the air gap.

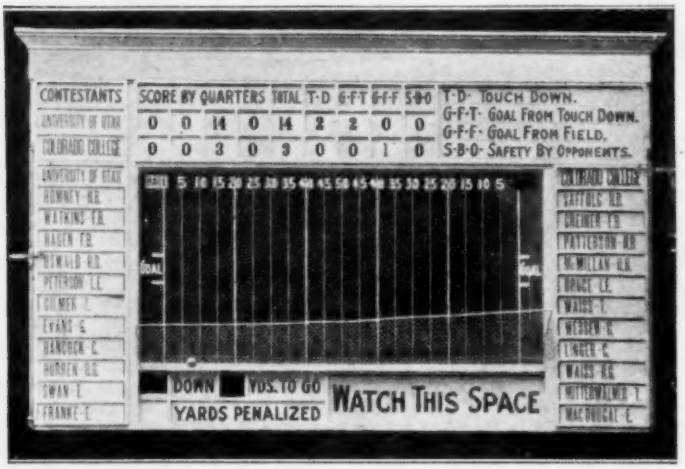
"FOOL-PROOF" SEAWALL BUILT WITH SHARP-EDGED TOP

Tourist bathers refused to consider the danger to their necks in diving off a seawall at Waikiki Beach, Honolulu, but strove to imitate the clever Hawaiian boys, who can dive in very shallow water. The beach authorities neglected this peril until a particularly enthusiastic "thrill-hunter" banged his head upon the hard bottom with such force that his neck was broken. Signs were immediately posted to warn other rash divers, but the wall continued to be used for a diving-off place. Finally a sharp triangular concrete top was put on the wall, and this stopped the dangerous practice.

Showing the Seawall upon Which was Built the Sharp Triangular Top

PROGRESS OF FOOTBALL GAMES REPRODUCED ON BULLETIN

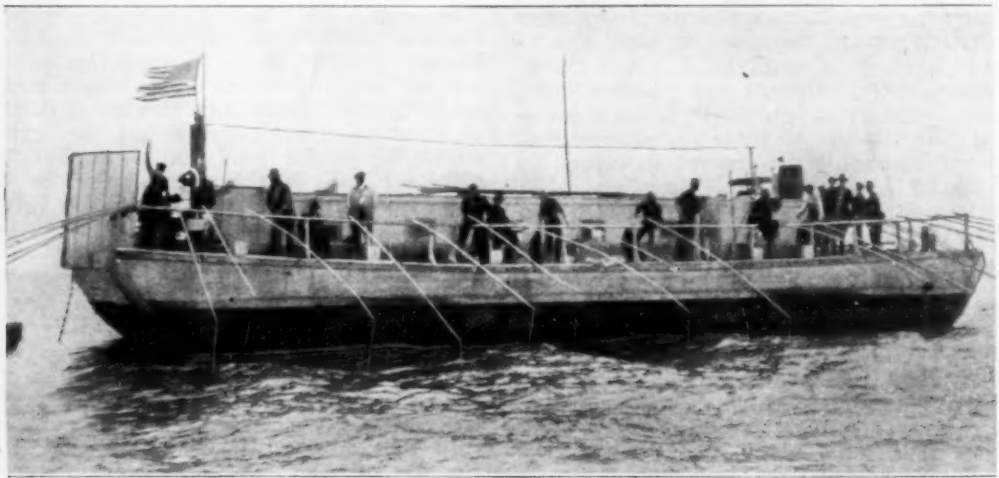
University of Utah football games, played away from home, were reported to the fans who could not follow the team this year, in a way that was almost as interesting as actually seeing the games. One of the Salt Lake City newspapers devised a bulletin board by means of which every move of the games could be reproduced. The board was a zinc plate, marked off to represent a football field. An electromagnet behind the plate served to move a light metal ball about the field, as the plays were reported over a special telegraph wire. Sliding arrows indicated the team in possession of the ball and the player carrying it. Cards, slipped into slots, showed the score by quarters, the score made, the down and yards to gain, and penalties. A large slot, marked "Watch This Space," was used to display additional information, as when forward passes were made or intercepted, or the ball lost on a fumble.



The Special Bulletin Board, Which Enabled University of Utah Football Fans to Follow the Play of Their Team during Out-of-Town Games, Showed Each Action of the Games within a Few Seconds After It Occurred

ANCHORED BARGE IS BOON TO ANGLERS

Although deep-sea fishing has long been a popular all-year-round sport in southern California, satisfactory facilities have never been provided. Recently, however, the situation has been bettered by the anchoring of a barge about two miles off Long Beach. Here poles and lines are provided, and one may fish to his heart's content. The barge contains some small staterooms, or cabins, and a dormitory with cots. There is also a kitchen and a cook to prepare the catch, if desired. Small launches run out from Long Beach at frequent intervals to transport the anglers who may wish to return to land.



One may Spend the Night in a Comfortable Stateroom or Dormitory Cot aboard This Barge, Which has been Anchored Two Miles off the Shore for the Benefit of Long Beach, California, Deep-Sea Fishermen, and Be Right on the Spot for the Early Morning Fishing

Some of the Residents of Point Barrow, Alaska, Greeting the First Ship on Its Arrival at Barrow, 12 Miles from Point Barrow Proper: The Woman at the Right, Carrying a Child, Is the Interpreter

BUILDING THE FARTHEST-NORTH HOSPITAL

By LAWRENCE WILLIAM PEDROSE

THERE was completed recently at Point Barrow, Alaska, the farthest-north settlement on the American continent, a modern hospital with all the facilities of an up-to-date establishment of this type. Besides being the farthest-north hospital, it serves the largest area for an institution of its kind in the world —more than 60,000 square miles.

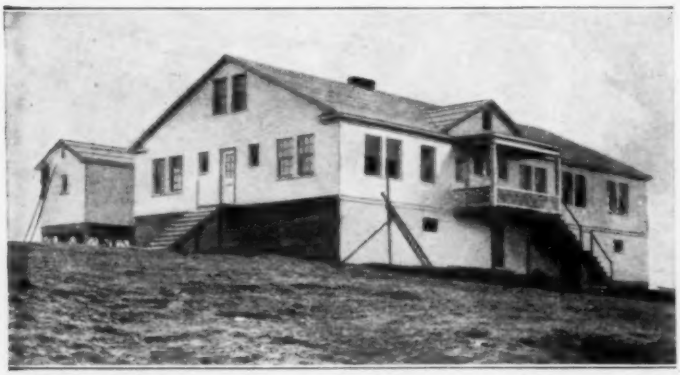
This hospital, costing $35,000, will require $16,000 a year to operate. The staff consists of a surgeon-physician, a trained nurse, one or two assistants, a housekeeper, and a janitor. Point Barrow and the immediate vicinity of the hospital have a population of nine white persons, including the surgeon and trained nurse, and about 450 Eskimos. In the territory which it serves, an area 200 by 300 miles in extent, there are some 400 or 450 more Eskimos. The medium of contact between the white doctor and the Eskimos is the wife of an American resident, a native woman who acts as interpreter.

In constructing the hospital the forces of nature had to be overcome. The materials were purchased in the States, sent to Nome by regular steamer, and transferred at the steamship terminal to small power schooners. Despite treacherous weather, which continued through the brief summer, the materials were delivered at Point Barrow the first week in September, 1920, so that the builders could get up the frame and inclose it before the snow came, and work on the interior during the cold winter weather.

After the Frost Set In, the Chimney had to be Completed with Steaming-Hot Mortar. It Was a Source of Wonder to the Eskimos

The main building is 38 by 70 ft., and the basement rests upon ice. Within the larger basement is a sub-basement, 16 by 40 ft., which houses two hot-air furnaces, electric-light plant, and stored supplies. The floors are of two thicknesses of 1 by 6-in. flooring, with a layer of tar paper

between. The roof consists of one layer of tar paper laid upon 1 by 6-in. tongue-and-groove lumber. Outside walls are constructed the same as the floor. The

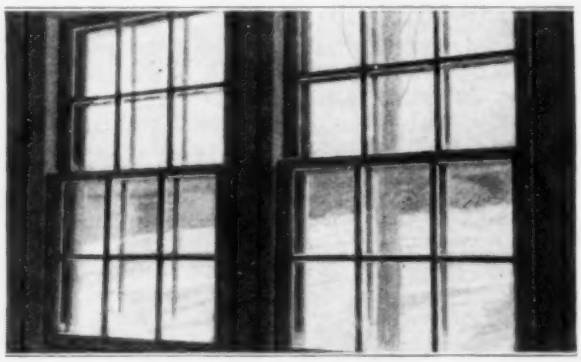


The Point Barrow Hospital as It Appeared When Completed Last Summer: The Building, Constructed of Wood and Tar Paper, was Finished with Two Coats of White Marine Paint

interior is finished with wood-pulp building board. Salt water and beach sand were mixed with cement to make mortar for the brick chimney.

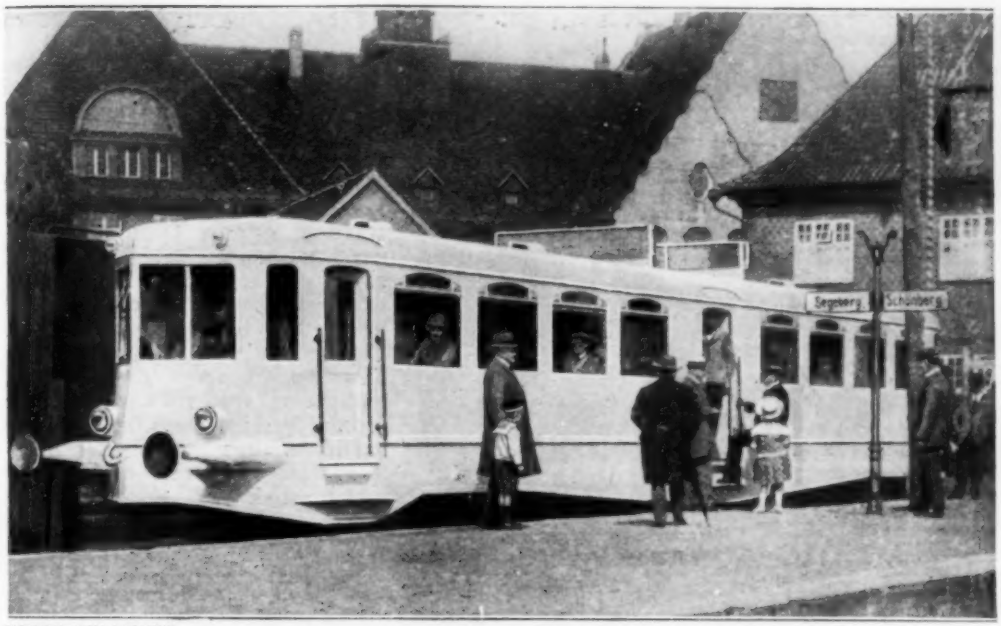
The building has at present 12 beds, with a capacity for 70 if required. It has a well-equipped dispensary, a complete up-to-date surgery, and maternity, tubercular, and general wards. During the four summer months, a cesspool and modern plumbing facilities are used. Sterilized snow water is utilized at all times. An interesting feature of the construction of the building is the windows. The original plan called for triple windows, to combat the cold, which ranges from 45° to 70° below zero in the winter time, but several sashes were broken in transportation, and there were left only two for each window. However, double windows serve effectually. Heat from the air furnaces is circulated by transoms over the interior doors.

The difficulties confronting the builders began when the materials were transshipped at Nome. The schooners carrying the freight became separated in a storm, and one was carried to the Siberian coast, where it lost its propeller in the ice. Twenty-four days were required to transport the materials from Nome to Point Barrow. Fifty-five tons of coal were carried. Two hundred tons were needed, but so severe was the weather, the balance, 145 tons, was not delivered that year, and the hospital went through the first winter sorely short of coal. Because of the danger that the Arctic Ocean might not open to navigation every summer, it is essential that two-years' supplies be carried on hand at all times.



Triple Sashes were Planned, but Many were Broken in Transportation, Leaving Only Two for Each Window

The Principal Buildings of Point Barrow, the Farthest-North Settlement in North America: At the Left Is the Church, in the Center the Mission School, and at the Right the New Hospital. The Two Nearest Modern Settlements Are 300 Miles to the South and 400 Miles to the East



COPYRIGHT, KADEL & HERBERT

One of the Street Cars Constructed from Discarded War Material: The Interior is Finished Complete in Every Detail and the Exterior Speaks for Itself. The Two Projections Seen on the Front of the Car Are "Bumpers," Which Is a Common Feature on European Street Cars and Railway Trains. The Headlights Are Directly above the Bumpers

The foundation of the building was begun September 6. The chimney was started on the 12th. When the chimney was up 30 ft., frost set in, and it was necessary to build a bonfire around the mortar and use it steaming hot. The chimney, when completed, was a source of wonder to the Eskimos, but the electric-light plant struck them dumb with amazement and fear. However, when the natives learned the incandescent lamps were harmless, they took great delight in turning them off and on and examining various details of the plant. The hospital was completed last summer. It is planned to extend the electric-lighting system this winter to the principal houses.

All the difficulties of administering to the sick in the Point Barrow district have not been conquered by the completion of the hospital. Breaking down the prejudices of the natives is said to be difficult, for, like their white brothers, the Eskimos have a dread of the surgeon's instruments and will not take medicine unless it is disguised as a sweetmeat. Also, the native "medicine men" invoke the spirits to contest the power of the white man. However, modern science is gradually winning over the fears and superstitions of the Eskimos, and they are becoming more and more receptive to the aid which is being given them.

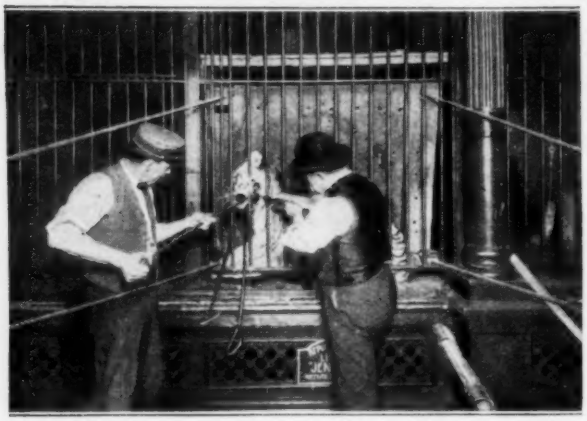
TANKS FROM GREAT WAR USED TO MAKE STREET CARS

The great Kiel plant in Germany, from which came so much of the war material, has now taken up more peaceable pursuits in the manufacture of street cars. These cars are made from the lumbering and rumbling tanks, and armored motor cars of all kinds, that carried explosives to the front, and which were ordered junked by the allies. They are driven by gasoline motors and are said to be complete in every detail.

MACHINE PERFORATES RAILROAD TIES TO BE CREOSOTED

A machine, said to be the only one of its kind in the world, is used by a San Diego, Calif., lumber company for perforating railroad ties in connection with creosote treatment. The ties are fed into the machine between four studded steel rollers. Heavy springs press the studs into the ties, penetrating the wood about one inch on all sides. The ties are then dipped in creosote. The holes made by the studs allow the preservative to penetrate the wood more deeply than it otherwise would, and the life of the ties so treated is considerably longer than that of ordinary creosoted ties.

LARGE LIONESS TREATED FOR ULCERATED TOOTH

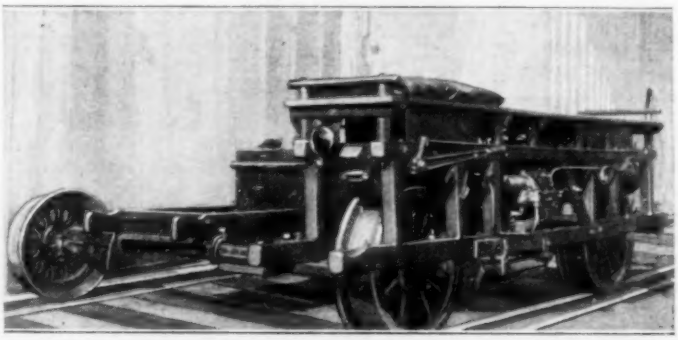


The Lioness Held against the Bars by the Wooden Partition: One Man Holds Her Mouth Open and the Other Injects the Medicine

One of the teeth of a large African lioness at the Cincinnati Zoölogical Gardens became ulcerated recently, and the animal refused to eat even juicy beefsteaks that were placed before her, until the painful tooth was treated. For treatment, the lioness was induced to enter a small cage next to hers, which had a wooden partition in it that could be pulled forward with ropes. The animal was then drawn up close to the front of the cage, and several iron rods were thrust around her and into holes in the partition, thus holding her helpless while the offending tooth was treated.

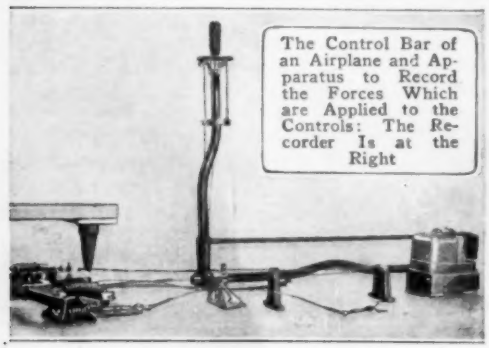
HIGH-SPEED HANDCAR BUILT BY SECTION FOREMAN

A motor-driven handcar of unusual construction has been placed in service by an Iowa section foreman. Being dissatisfied with the handcar supplied by the railroad, he decided to make one after his own ideas. A twin-cylinder motorcycle engine was used, and a three-speed transmission fitted to it. The engine is started with the regulation pedal starter common to motorcycles, and is equipped with an ignition-lighting system. As the handcar weighs but 350 lb., one man can handle it, and it is claimed that a speed of 40 miles an hour has been maintained for a distance of 72 miles by the car, which is now considered a most valuable aid by the section foreman.



The High-Speed Handcar Placed on the Track and Ready for Use: The Engine, Taken from a Motorcycle, can be Seen Mounted at the Side, with the Exhaust Underneath. The Headlight is Seen on the End below the Seat

AIRPLANE-STABILITY TESTS TO MAKE FLYING SAFE



The Control Bar of an Airplane and Apparatus to Record the Forces Which are Applied to the Controls: The Recorder Is at the Right

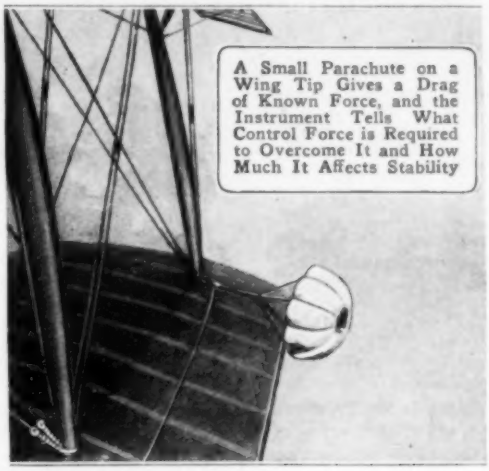
If an airplane with its rigging intact and a capable pilot in command, responds readily to the controls, most airmen are satisfied to regard it as a stable machine. It is somewhat surprising, therefore, to learn that the standard-rigged "JN-4H," a highly satisfactory training plane, has been found to be unstable by the National Advisory Committee for Aeronautics, after a series of tests at Langley Field, Va. The stable machine is held to be one that will virtually "fly itself" with free controls, and that may be brought to the earth in safety

These Three Lines Represent the Variation in Forces Applied to the Controls of an Airplane in Flight as They Appear on the Recording Film in a Turn to the Left and to the Right. The Regularity or Irregularity of the Lines Indicates the Stability or Lack of Stability of the Plane

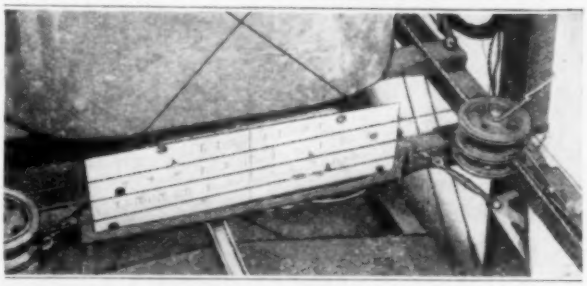
should a control wire become broken or ineffective.

The principle involved in the tests is that of a man holding a mirror which reflects a beam of light upon a moving film. Although his hand may appear perfectly steady to the eye, the unseen tremors will record a series of jagged lines on the film, not unsimilar to the record of a seismograph. In the same manner, the unconscious movements of the pilot in righting his machine against the forces of instability may be recorded.

In the application of the principle to the airplane, the control bar, or "joy stick," may be said to correspond to the hand holding the mirror. The stick has been connected with the mirror of a recording machine which reflects a constant beam of light upon a traveling film. Each movement of the controls in meeting forces is therefore translated to the film, and at the same time the force necessary to overcome the unstable tendency is registered on a visible scale in the cockpit.

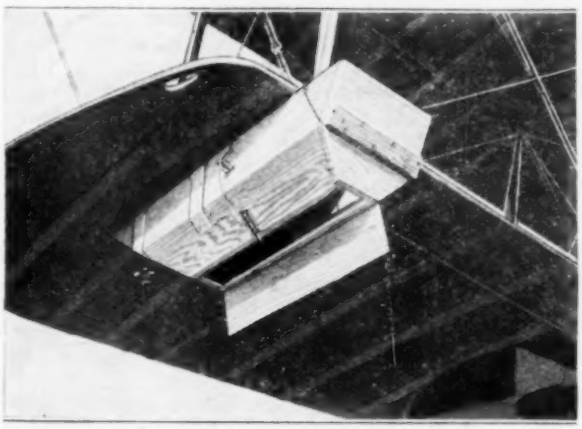


A Small Parachute on a Wing Tip Gives a Drag of Known Force, and the Instrument Tells What Control Force is Required to Overcome It and How Much It Affects Stability



Positions Assumed by the Controls in Meeting Forces are Read on This Scale Which is Placed in the Cockpit

To determine whether or not a machine is capable of righting itself in the face of weights or drags at the wing tips, ballast boxes and small parachutes are fixed on the underside of the lower plane. The machine is unbalanced by emptying the ballast from one of the boxes or by releasing one of the parachutes, and the force necessary to overcome the yaw or sideslip thus produced is recorded at the pilot's position.



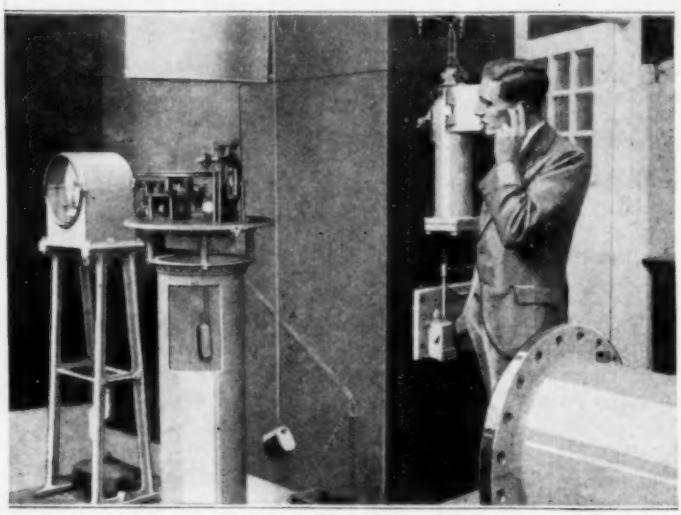
A Box on Each Wing Tip is Filled with Sand. By Emptying One Box, the Effect of Throwing the Plane Out of Balance can be Observed

---

¶The copper roof on the Buddhist temple in Nagoya, one of the principal cities of Japan, is 510 years old and is still in perfect condition.

VOICE TELLS HEIGHT OF WATER BY PHONOGRAPH MECHANISM

Warnings are usually given of the rise and fall of water in reservoirs, wells, tanks, etc., by the use of electrically operated alarm bells, but the system of bells has been improved upon by an English concern. The new apparatus, which operates after the fashion of a phonograph, has a telephone receiver placed in front of the speaking tube, and the mechanism is set in motion by the "ringing in," or connection, of a telephone operator. Thus anyone knowing the "number" of the machine, can "call up" and be connected in the same manner that any call is made. To the listener's ears comes the somewhat uncanny voice of the mechanical sentinel, saying anything from "Empty" up to "One double-nought," which means 100 feet.



At the Left: "Visible" Water-Level Recorder. In the Center: "Audible" Mechanism. At the Right, the Man is "Calling Up" the Apparatus

The appliance has a disk record with 200 concentric grooves, so as to give the height of the water in "half feet," and 78½ ft. would be given as "seven-eight-half," etc. The height of the water regulates the lateral, or side, movement of the arm holding the needle, and the telephone connection automatically lowers the needle upon the record. The readings, or "answers," are repeated eight times, so that the chance of any mistake is reduced to a minimum, and the machine can be "asked" 100 times without being rewound.

¶ Our Bureau of Information is for your benefit. Use it as often as you please.

SCIENTISTS STUDY INFLUENCE OF HIGH ALTITUDE ON LIFE

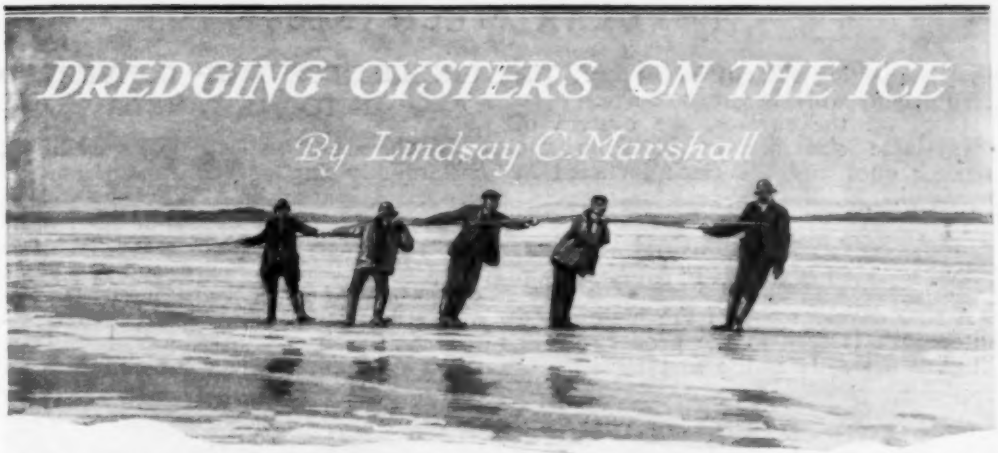
In the Andes, in Peru, 14,000 ft. above sea level—nearly as high as Pikes Peak—is one of the world's largest copper mines, and the adjoining town of Cerro de Pasco is one of the highest towns having a substantial population. In this high altitude the air is of course exceedingly rarefied, and persons going directly from sea level to this height find physical exertion difficult, and experience other serious discomforts due to the lack of oxygen supply and diminished air pressure. Yet the natives work arduously and live in comfort. What physiological changes—what alterations of the heart, circulation, respiration, chemical composition of the blood, etc.—enable these people to live permanently in this high altitude? Answers to these questions will be sought by eight medical scientists, five American and three British, who are now en route to Peru. It is expected that the information they will obtain will be useful in the treatment of certain diseases of the heart and lungs and also in the field of aviation.

"SLOW RACE" NOVEL AUTO TEST AT CLEVELAND

It is difficult to find anything new in the way of automobile tests nowadays, but the novelty of a recent race in Cleveland, Ohio, is attracting attention. A local automobile manufacturer invited all drivers of his cars, in the city, to enter a "slow race." The course extended 2.3 miles through the city parks. Ten entrants started their cars, shifted to high, and got out before crossing the starting line. They then walked beside the cars, controlling them by the spark lever only. The winner completed the course in 46 min. 10 sec., and the second car in 40 min. 1 sec. The police department, hearing a race was to be held, sent several mounted police to the scene. They soon decided the race would not interfere with traffic, but became interested and joined the large crowd of spectators, which had gathered to watch the novel event.

DREDGING OYSTERS ON THE ICE

By Lindsay C. Marshall



The Men are Dragging the Oyster Dredge over the Bed from One Hole in the Ice to Another, the Rope Passing along a Narrow Slit Cut in the Ice

OYSTERS in the Maryland rivers are not safe from capture even when protected by 9 to 12 in. of ice. Ordinarily, the bivalves are won from the shallower portions of the oyster bed by means of tongs not exceeding 20 ft. in length; but about once in every five years an unusually cold winter closes to the oyster men the ordinary avenues of reaching their "game," and they are forced to resort to ice dredging. The ice, however, is not an unmitigated evil, for it enables the men to reach the deeper portions of the beds, 40 ft. or so below the surface, and these are the more profitable because of being worked only occasionally.

The method of operating is simple but effective. A long rope is fastened to an ordinary oyster dredge, which is then lowered through a hole in the ice to the oyster rocks below. The dredge is drawn by man power to a similar hole some distance away, the rope working in a nar-

Sorting the Marketable Oysters from the Smaller Ones and the Débris Brought Up by the Dredge: The Young Oysters are Redeposited on the Bed and the Refuse Left to Disappear with the Ice

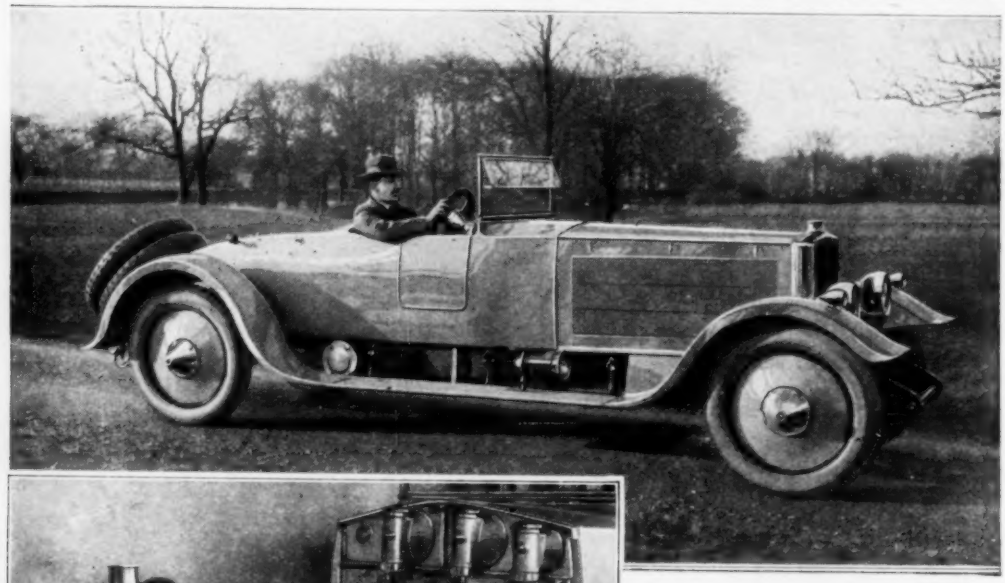
Sledding the Catch across the Ice to Market: The Difficulties Incident to Ice Dredging are Offset by the Higher Price Due to Scarcity

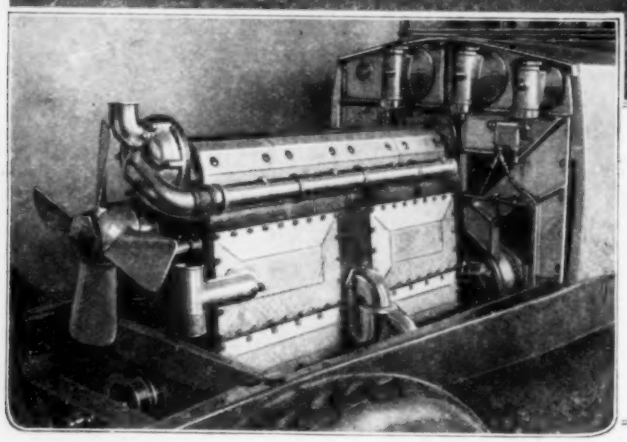
row connecting slit cut in the ice. The men usually work in gangs of five.

Once on the surface, the oysters of marketable size are culled from the smaller ones and the trash included in the haul.

LATEST ENGLISH CAR HAS "STRAIGHT EIGHT" MOTOR

A new development of the high-priced automobile is seen in the product of an English firm. It is the first British car with eight cylinders in one line instead of the usual V-form. The engine is narrow and particularly neat in design. It has overhead valves and is rated at 40 hp., has thermostatic control of engine temperature, and a single-disk clutch. The car is provided with four speeds, and the starting motor is built into the gear housing. It has a beveled rear axle, splayed axle shafts and wheels, and an effective torsional antirolling device applied to front and rear axles.

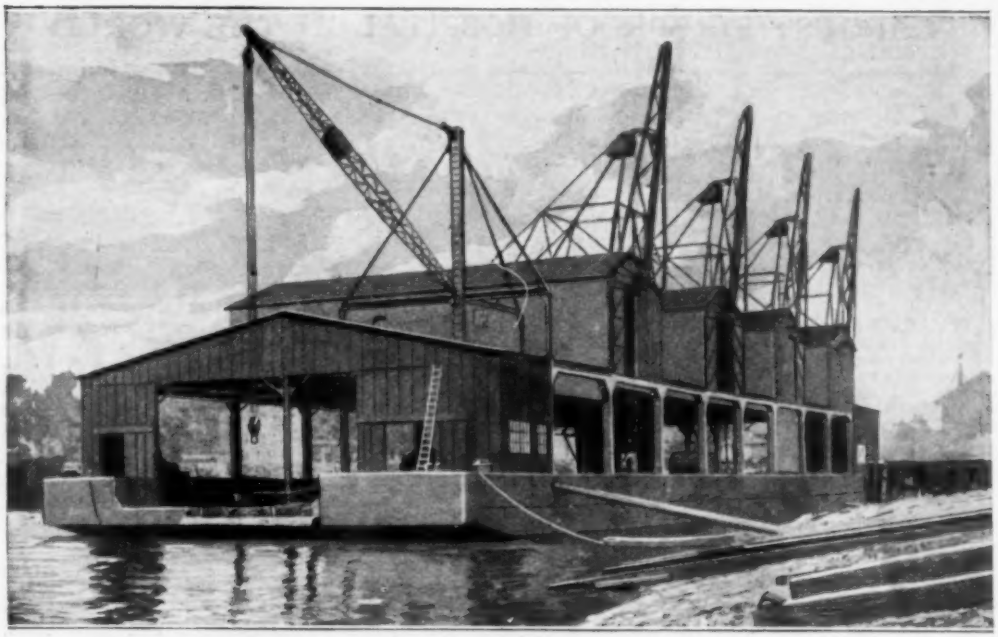




The New English Automobile, Shown Above, is Equipped with a Straight Eight-Cylinder Motor. It Is the Most Recent English Development of the High-Priced Motor Car. The Motor is Shown at the Left. The Neat, Narrow Effect of Placing the Cylinders in a Single Straight Line Instead of the Usual V-Form, can be Appreciated. It is Rated at 40 Horsepower and is Equipped with a Thermostatic System for Control of the Temperature. A Starting Motor is Built into the Gear Housing

SINGLE-DECK SHIP CONVERTED INTO OIL TANKER

By the use of specially designed tanks, an ordinary single-deck steamer has been converted into an oil tanker. The vessel, owned in Glasgow, Scotland, is of 5,522 gross tonnage, and is fitted with three main cargo tanks forward, and two abaft of the machinery space. These are constructed of four segments of cylinders attached at their ends to deep frames at the ship's side, and at their inboard ends to vertical webs. The forward and aft tanks are shaped in conformity with the ship's lines. Together these tanks have a capacity equal to the vessel's full deadweight carrying capacity, and the spaces between them, being buoyancy compartments, add to the stability. The tanks are connected to the upper deck above and to the inner bottom below, and together with the deep vertical webs between them, do away with the necessity for a centerline bulkhead.



The Large Government Barge, Which Has Four Electric Cranes with 45-Foot Projecting Tracks Folded Up along the Side, and a 20-Ton Hoisting Derrick: At the Ends Are Large Openings for the Passage of Railroad Freight Cars, of Which 12 can be Accommodated on the Three Tracks of the Barge at One Time. The Inclosed Roof is Constructed of Steel

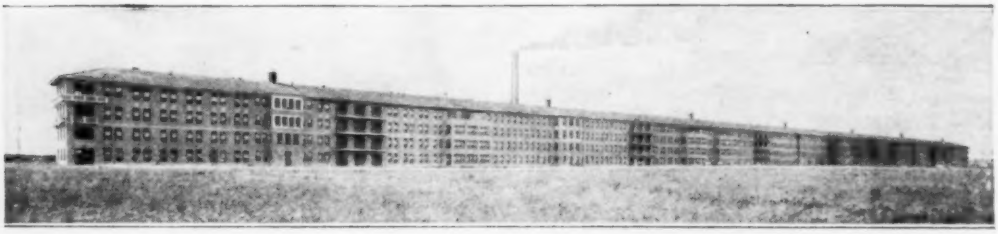
GIGANTIC SERVICE BARGE FOR MISSISSIPPI SHIPPING

The singing, whistling, and happy-go-lucky negro roustabouts are being superseded by electric cranes and hoisting derricks in the handling of freight on the Mississippi River. During the late war, the government let contracts for the building of large terminal barges, and the last of this type of barge to be completed has recently been stationed for service at St. Louis. The barge is 320 ft. long, which is longer than an ordinary city block, is 75 ft. wide, which would be about twice as wide as a city street, and has an inclosed steel roof. The hold of the barge has been divided into compartments for carrying fuel oil, or similar liquid cargoes, and there are two electric pumps for transferring the liquids to boats or tank cars. Three railroad tracks are laid on the deck, and 12 freight cars can be run onto the barge at one time, to be unloaded. Four electric cranes and a 20-ton hoisting derrick are used for unloading, and the cranes have a projecting track which allows them to run out over the side for a distance of 45 ft. The projecting tracks can be folded up when not in use. The barge is electrically equipped throughout, and for night illumination, 24 clusters of lights, aided by a row of lights along the side, have been installed. In addition, there are 16 portable clusters of lights with reflectors, which can be placed where needed. Boats plying between St. Louis and New Orleans, and St. Louis and St. Paul, will use this barge, which cost 400,000 dollars.

GOVERNMENT SCIENTISTS WILL STUDY LAND REQUIREMENTS

In appointing a committee of five scientists from the Department of Agriculture to study the important problem of land utilization with regard to future requirements, Secretary Wallace called attention to several important facts. Many people believe that, with less than one-half of the national area in farms and only about one-quarter of it improved land, there is an unlimited reserve supply of farm land. By far the greater part of the 1,000,000,000 acres not yet in farms can never be used for growing crops, and land that can be made into farms will require heavy expense for clearing, drainage, irrigation, or fertilization. At the normal rate of growth, the population of the United States will reach 150,000,000 by 1950, requiring an addition of 243,000,000 acres of improved land, if the present per-capita acreage is to be maintained.

LARGEST FIREPROOF HOSPITAL IN THE WORLD



COPYRIGHT, UNDERWOOD & UNDERWOOD

SITUATED to the west of Chicago, near the suburb of Maywood, is what was formerly known as the Speedway Hospital. More recently its name has been changed to the Edward Hines Jr. Hospital. It got its original name from the fact that its site was formerly a speedway for automobile racing. It is a U. S. government hospital for sick and wounded soldiers and sailors, increasing numbers of whom are being cared for there. It is entirely fireproof, and is 2,040 ft. long, 50 ft. wide, and four stories high. It contains 1,284 rooms, 500,000 sq. ft. of cement flooring, and 200,000 sq. ft. of roofing. The grounds have an area of 320 acres. The surrounding scenery is somewhat bleak, but this affords the advantage of offering no obstructions to the circulation of fresh air.

COURSE OF RIVER CHANGED BY SINGLE BLAST

Because of the new channel that was scoured out by the Arkansas River at a point 14 miles above Pueblo during the season of disastrous floods last year, it was found necessary to change the course of the river again to provide water for the irrigation projects. It was proposed to blast down an overhanging rock and thus form a dam that would force the water into the irrigation ditches. The lower part of the rock was sandstone, while above were thin strata of limestone and shale. It was along the base of this rocky bluff that the new channel had been formed. Owing to the fact that, after the waters had subsided, most of the flow continued along the new channel, the head on the ditch gates was greatly lowered.

Before the Blast the River Flowed in Its New Channel about the Base of This Cliff

For this work of blasting, 5,000 lb. of black powder was used to shatter the rock, and considerable dynamite was mixed with the powder to insure better ignition and splitting effect. A tunnel, 6 ft. high and 4 ft. wide, was driven 35 ft.

Five Thousand Pounds of Powder and Dynamite Blew the Cliff into the Channel, Effectively Damming It So That the Current was Controlled and Water Was Again Available for the Irrigation Ditches

straight into the cliff, with a 5-ft. side branch at this point, whereupon the tunnel was driven 10 ft. farther. It was in this last part that the charge was placed.

When this tremendous charge was touched off, a block of the cliff was torn off and fell, crushed into fragments, thus forming a dam across the channel and controlling the current, as had been planned. In a short time the irrigation ditches were filled to capacity because of the 8,000,000 lb. of rock that had been dislodged in the single great blast of powder and dynamite.

¶Vessels at sea are to be supplied with a radio-news service relating to derelicts, sunken or floating wreckage of all kinds, misplaced harbor buoys, mines, ice, rafts, and any other items of interest, through an arrangement between the U. S. Navy Hydrographic Office and the Naval Communication Service.

DOGS USED FOR WINTER TRAVEL IN NORTHERN QUEBEC

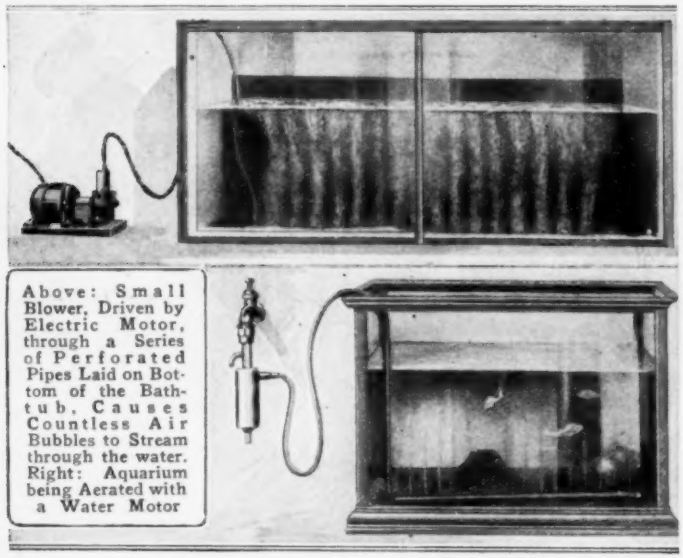
At Sanford Junction, Quebec, Can., a favorite means of travel in winter is on skis, with a dog, in harness, to pull the ski rider over the frozen trails. There, throughout a large part of the year, dogs furnish the most important, if not the only, means of transportation. They are used for all kinds of hauling and some of the things they can do are surprising to a person unfamiliar with the use of dog sleds. It is a common thing for two dogs to haul a log 25 ft. long and 10 in. thick at the butt. Again, their load may be ice, to be stored for the summer, firewood, or provisions, and the passenger sled is an everyday necessity, which is ordinarily pulled by a single dog.

Dogs at Work in Northern Canada, Where They Are Most Important in the Winter Life of the People

Dogs Also Take Part in Winter Sports as Shown at the Right. Ski Riding, with a Dog to Pull the Rider, Is Great Fun —for the Rider

APPARATUS FOR AERATING WATER IN A BATHTUB

Bathing in water medicated with gases, such as carbonic acid or oxygen, is a well-known treatment for various complaints. It is claimed that water aerated by a new device is just as beneficial. The aerating apparatus consists of a small blower direct-connected to a tiny electric motor. A hose connects the discharge port of the blower to a series of perforated pipes laid on the bottom of the bathtub. From the perforations countless little air bubbles continuously float upward through the water to its surface. The speed of the motor can be controlled to regulate the flow of these bubbles as desired. The same thing is done, but with less pressure and with only a single pipe, in aquariums.

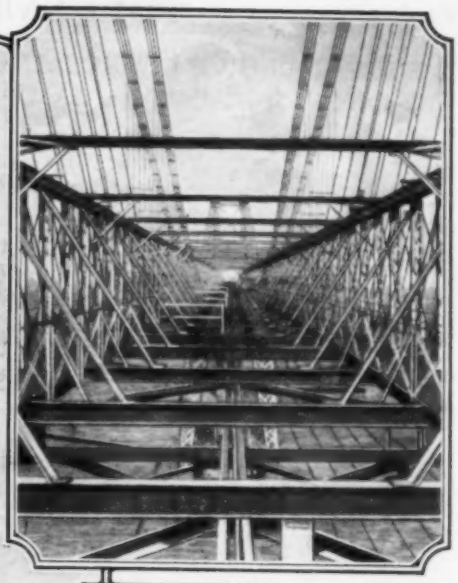


Above: Small Blower, Driven by Electric Motor, through a Series of Perforated Pipes Laid on Bottom of the Bathtub, Causes Countless Air Bubbles to Stream through the water. Right: Aquarium being Aerated with a Water Motor

SUSPENDED FERRY CARRIES TRAFFIC ACROSS ENGLISH RIVER

A NOVEL kind of bridge for transporting pedestrians and vehicles across a river, without interfering in any way with the passage of full-rigged ocean-going shipping, is in operation at the town of Newport, Eng., on the river Usk, four miles from its junction with the Severn. On account of the steepness of the banks, the great rise and fall of the tides, the length of the span, and the height of headway needed, any ordinary kind of bridge was impracticable, and therefore this special kind, called a "transporter bridge," was erected.

The stationary members of the bridge consist of a pair of supporting towers, 242 ft. high, on each bank of the river. These carry two trussed girders, 16 ft. deep and 26 ft. from center to center, across the span of 645 ft. The towers are braced, and the girders are partly supported by cables in the manner of a suspension bridge. The towers are of steel latticework, and each pair, connected above to the trussed girders and inclined outwardly at their concrete foundations, resembles closely a pair of exaggerated derrick booms. The total clearance from high-water level to the underside of the span is 177 ft. The horizontal trussed girders are tied together and braced as in any ordinary bridge span, and their bottom chords form a track, in each case, for 15 wheels on either side of its web. These wheels are carried on steel brackets which are part of a large traveling frame, 104 ft. long, which forms the means of transporting a suspended platform or carrier. This is like a section of a bridge deck, 33 ft. long and 40 ft. wide. It has a central roadway large enough for two four-wheeled vehicles, and on each side there is a roofed-in sidewalk. The whole is electrically lighted. The suspension of this carrier from the traveling frame above is a very elaborate system of 30 cables, trussed so as to brace the carrier against swaying under any wind conditions. The traveling frame that transports this carrier is propelled by a continuous cable driven by a drum in connection with two 35-hp. electric motors in the power house near one end of the bridge. All control is operated from a pilot house on the carrier, which moves at a speed of 60 ft. a minute, taking 10 minutes to cross from bank to bank. The bridge is designed to carry safely a moving live load of 66 tons.



Left: View from Water Level of the Transporter Bridge, Showing the Platform or Carrier That is Suspended from the Traveling Frame above, and Which Transports This Carrier across the River. The Central Part of the Carrier Is for Vehicles and the Covered Sidewalks Are for Pedestrians. The Elaborate System of Suspension Cables Prevents Swaying under Any Wind Conditions. The Two Inclined Towers at the Farther End Support the Trussed Girders and Their Bracing. Above: Upper View of These Trussed Girders and Their Bracing

The Transporter Bridge Complete without the Traveling Frame and the Suspended Platform or Carrier Which It Transports across the River: From One Pair of Supporting Girders to the Other, the Span of the Trussed Girders and Their Bracing Is 645 Feet. The Towers are Braced and the Trussed Girders are Partly Supported by the Suspension-Bridge-Like System of Cables and Hangers Seen in the Picture

CARNIVAL CROWD ENTERTAINED BY NOVEL PUSHBALL GAME

Among the many variations of the game of pushball that have appeared from time to time, one of the most novel has been the use of hose as the means of driving the ball. Such a game, played at a recent carnival at Sevenoaks, Eng., could well be called firemen's pushball, for it was played by two teams, each composed of four local firemen equipped with fire hose. The streams of water were the only means allowed for pushing the ball, and the game became fast and exciting. Of course the players were soaked, and occasional showers which sprinkled the spectators only added to the general merriment.

COPYRIGHT, KADEL & HERBERT

An Exciting Moment in the Game of Firemen's Pushball: With Spray Flying in All Directions, the Players are Taking the Ball down the Field for a Try at Their Opponents' Goal

"HOME-PORT" PLATES POPULAR FOR AUTOMOBILES

Automobile owners in different cities throughout the country have recently been won over to the fad of carrying across their radiators, suspended from the light brace rod, neat brass or black-and-white plates bearing the names of their home towns.

Stealing a leaf from the book of shipowners, the motorists are labeling their cars with their "home ports," and it is hinted that the plates serve a double purpose. They not only inform citizens of different communities regarding the home towns of visiting motorists, but in those towns they stamp the resident motor owner as such, and perhaps win for him a little more consideration from the police than the visitor gets.

LAUNDRY ASSOCIATION TO HAVE METHODS-TESTING PLANT

An American institute of laundry-research work, for testing laundry methods, materials, and machinery, will be established by the Laundry Owners' National Association, at some town near Chicago. The association already maintains a fellowship in the Mellen Institute of Pittsburgh for chemical research, which has done much good, but it is so anxious to improve laundry methods that it intends to establish its own laboratories and maintain its own experts. The idea is not to build a model laundry. The plant will be a place where members of the association may have their individual problems worked out, or where they may send members of their staffs for study and observation. The plans are already completed.

TEST MAKES BURIAL VAULT SERVE AS WATER CRAFT

Paddling down a river seated on top of a 600-lb. iron vault, is a curious method of travel, but it was used recently on the Sandusky River at Upper Sandusky, Ohio. It was not a pleasure trip, however, but a public demonstration of the water-tight character of that particular make of burial vaults. After a one-mile trip, during which the vault was in the water for one hour 55 minutes, it was found to be perfectly dry inside.

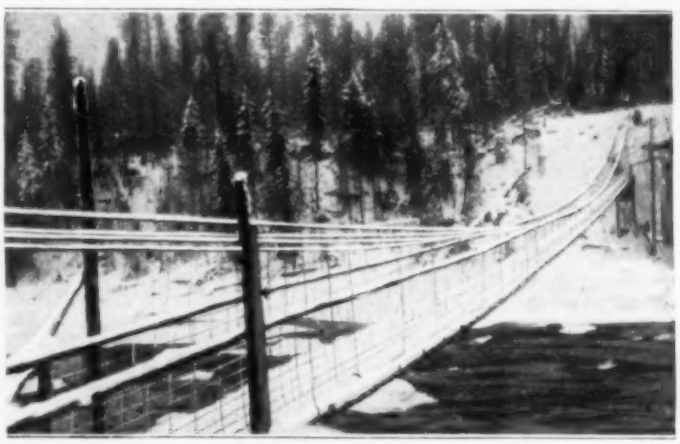
Hardly a Rival for the Birch-Bark Canoe as a Means of Travel, but a Most Effective Test of the Water-Tight Character of the Vault

TERRACED SUMMER GARDEN FOR GOVERNOR OF THE PHILIPPINES

WHEN General Wood inspected his future summer home, as governor of the Philippines, recently, he was delighted with this beautiful terraced garden, reached by many flights of stone steps from his summer residence. It was originally planned, on the hillside at Baguio, Benguet Province, by the natives, but was completed by expert Filipino landscape gardeners. The general effect of the garden is Oriental, but there is also an entirely original atmosphere about it, not to be found anywhere else in the world.

OLD TELEGRAPH CABLES USED TO BUILD FOOTBRIDGE

A very interesting footbridge spans the North Thompson River in British Columbia, of which the entire superstructure is built of cables. These cables are made up of 15 strands of galvanized wire which was originally intended for use in a telegraph line that was to reach Paris from New York, over Alaska and Siberia. The project was abandoned, however, when the Atlantic cable was successfully opened. The cables and other material were then cached at various points along the proposed route of the telegraph line and were subsequently appropriated by the settlers. In its final use as the suspension footbridge, the wire still performs important service.



Footbridge Suspended by Means of Cables Which were Originally Intended to be Used as Part of a Telegraph Line from New York City to Paris, France, by Way of Alaska and Siberia

IMPROVED RAILWAY SIGNALS INSURE SAFETY IF BROKEN

In the old, and still nearly universal, type of railway signal, the semaphore or

Two Samples—One with Single and the Other with Double Semaphores—of the New Railway Signal That Rises, Instead of Falling to a Horizontal Position, to Indicate Safety

arm stands horizontally to indicate danger, and falls to a position parallel to the post to indicate safety, or line clear. The objection to this method is that in case of a break in any part of the operating mechanism the semaphore may drop by gravity to the hanging position, and thus signal safety when there might be danger. In a new form of signal, by reversing the position of the semaphore and making it stand upward instead of downward, to indicate safety, it is obvious that in case of a break of the operating mechanism the force of gravity brings the semaphore to the horizontal position, where it is stopped, indicating danger instead of safety. This may cause some delay and inconvenience, but it will never lead to a wreck, as has actually occurred more than once with the other method.

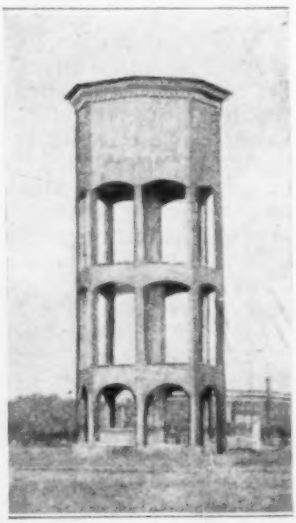
Ordinary Type of Railway Signal in Which Semaphores Hang Vertically to Indicate Safety or as Shown to Indicate Caution

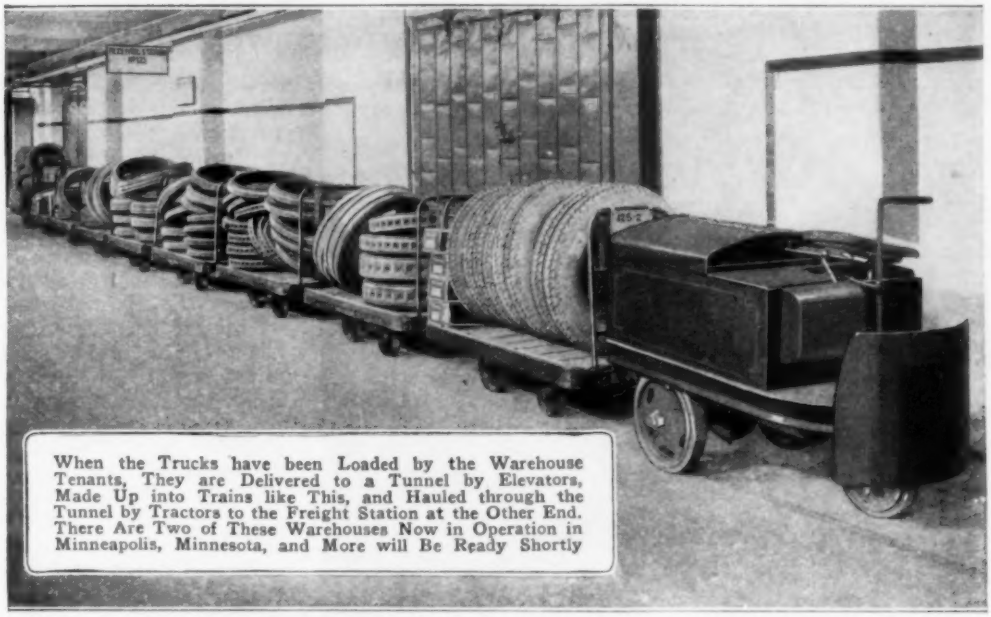
SIX-MILE EXTENSION PROPOSED FOR MANHATTAN ISLAND

About 10 years ago T. Kennard Thomson, a well-known engineer, startled New York City by a proposal to extend the area of Manhattan Island by means of built-up land. The plan, described in Popular Mechanics of August, 1911, has again been proposed, to the Broadway Association, which has been convinced of its desirability, if not of its practicability. The idea is that, by means of concrete sea walls, the island can be extended about six miles into the bay, close to the coast line of Staten Island, adding about six square miles of extremely valuable real estate to Manhattan Island. This would relieve congestion, keep the center of the city in its proper place instead of allowing it to follow the present tendency to drift north, and enormously increase the tax resources as well as debt limit of the city. Returns from such a project, if carried out, would far more than compensate for the expense involved.

STANDPIPE BUILT OF CONCRETE IS UNUSUAL AND ARTISTIC

A standpipe, which is both unusual and artistic in appearance, was built to furnish a reserve supply of water to a hospital near Grand Rapids, Mich. It is constructed entirely of concrete, including the cross girders and braces, as well as the supporting columns. Even the supply pipe, which connects the tank at the top with the water mains, is of the same material. The tower is 300 ft. high and 50 ft. in diameter at the base.



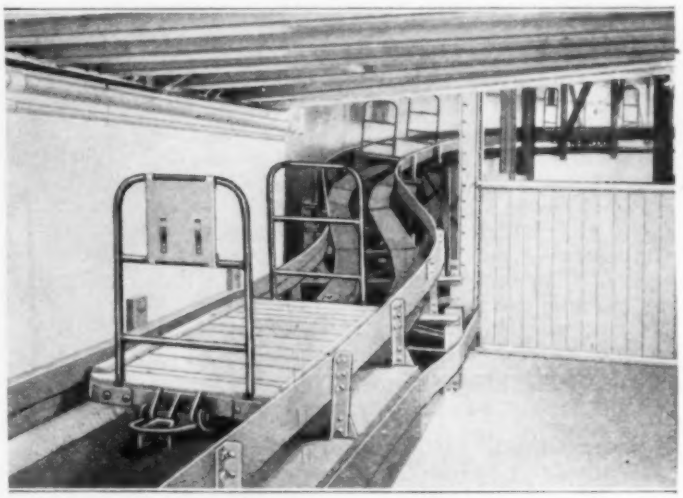


When the Trucks have been Loaded by the Warehouse Tenants, They are Delivered to a Tunnel by Elevators, Made Up into Trains like This, and Hauled through the Tunnel by Tractors to the Freight Station at the Other End. There Are Two of These Warehouses Now in Operation in Minneapolis, Minnesota, and More will Be Ready Shortly

TERMINAL-WAREHOUSE SYSTEM DEVELOPED IN MINNEAPOLIS

A new warehouse system affords facilities to manufacturers who wish to establish branch warehouses in Minneapolis, Minn. Space is rented in a series of standard warehouses, two of which are completed and in operation. At one end of the system is a joint freight station, connecting with all steam and electric railroads entering the city. Each tenant loads outgoing shipments onto small trucks and delivers them to elevators which carry them to a tunnel. An electric towing car picks up the loaded trucks and hauls them through the tunnel to the freight station, where the goods are loaded into cars. The loaded cars are pulled to the city transfer yards for distribution to the roads over which they are routed. A post office and express office, in the station, take care of shipments to be made by mail or express, and motor trucks handle city deliveries so that the tenant need not invest in trucking equipment. The small trucks, when emptied, are returned by a gravity track to the warehouses, where tractors distribute them to the tenants' elevators. Incoming freight is handled in the same way from the station to the warehouses. A system of sidetracks and loading platforms is provided along the warehouses for handling carload shipments.

¶ We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.



After the Trucks are Unloaded at the Freight Station, They are Placed on a Track and Run Back to the Warehouses Where They are Redistributed to the Tenants. Some of Them can be Seen Here Running Back by Gravity

CINCINNATI FIRE DEPARTMENT OPERATES A "COFFEE TRUCK"

Firemen in Cincinnati, Ohio, will always be sure of a cup of hot coffee when fighting fires this winter, and will no longer have to depend on the possible generosity of some restaurant proprietor when cold and weary from their strenuous work. A "coffee truck" has been added to the department's equipment and answers all calls to big fires at night. It is a light truck with a big coffee urn mounted on the rear. A special subscription fund, to which all the city firemen contribute, keeps it going.

Some of the Firemen of the Cincinnati, Ohio, Fire Department and Their New "Coffee Truck," Which Answers All Night Calls: The Fire Fighters will Always Have a Cup of Hot Coffee to Thaw Them Out in Freezing Weather

HIGH-GRADE IRON PRODUCED FROM MAGNETIC SAND

The process developed in New Zealand some time ago, of converting the large deposits of iron, or magnetic, sand found there into pig iron, has been adopted by the Japanese for the exploitation of their own vast deposits of this form of ore. The process consists of combining the iron sand with coke, by using hot gas flames. The product is then called ferrocoke, from which a fine grade of iron is easily produced.

¶ Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

RICE HULLS ARE CONVERTED INTO USEFUL PRODUCTS

The amount of waste in the rice crop has always been about one-third of the total crop, in weight, but a Berlin, Germany, inventor claims that he has solved this problem of waste and can utilize the hitherto useless rice hulls for many useful products. By a process of steam application, three-fourths of the hulls' weight can be made into cellulose for the manufacture of paper, and by another process, four-tenths of the hulls can be made into coke filter materials, such as are used in the manufacturing of sugar. Besides these, paraffin, phenolin, carbonic-acid gas, carbon monoxide, hydrogen, and acetic acid can also be produced in sufficient quantities to be commercially worth while reclaiming.

RAILWAY COAL BILL REDUCED BY CONSTANT REMINDERS

For the purpose of constantly impressing upon its employes the virtue of saving coal, a railroad has placed many reminders along its right of way. This experiment has been in effect for some time, and according to the officials of the road, has given very satisfactory results.

COPYRIGHT, UNDERWOOD & UNDERWOOD

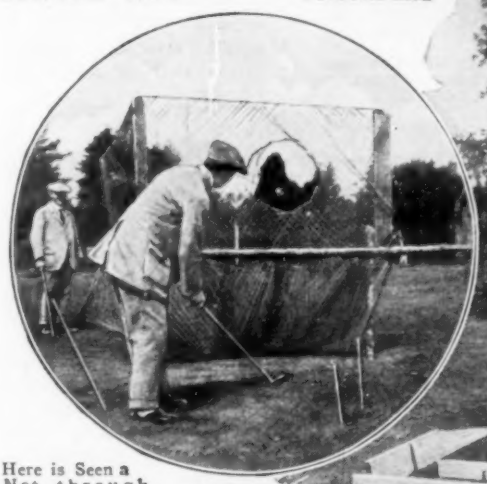
This Shows One of the Railroad Towers along the Right of Way with a "Reminder" Posted upon It That will Be Sure to Catch the Eye of the Locomotive Crew

NINE-HOLE GOLF COURSE WITH UNUSUAL HAZARDS

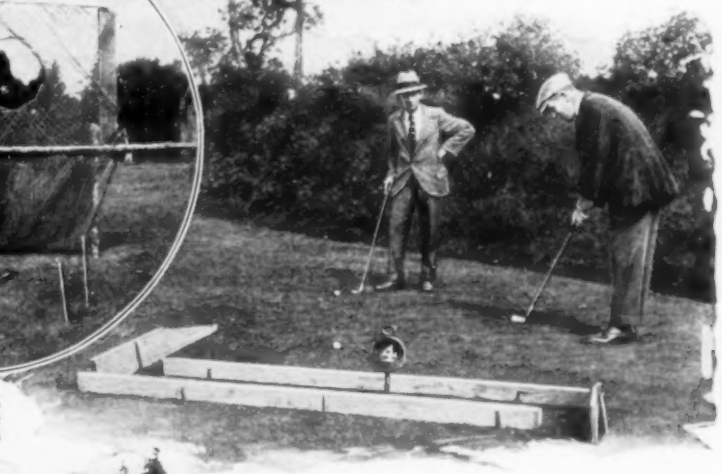
By H. A. LANE

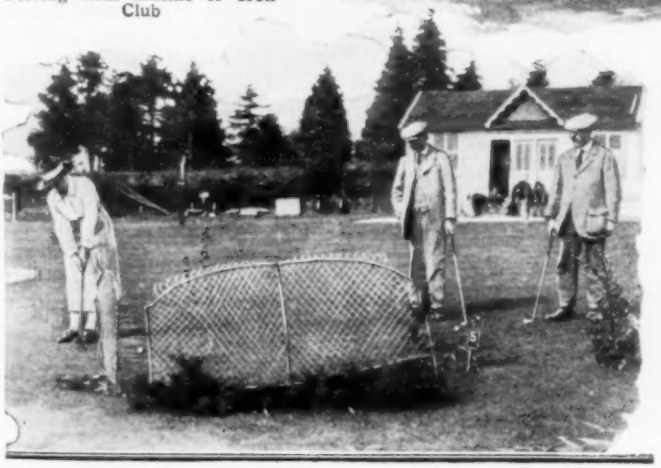
THAT variety is the spice of life is certainly illustrated on an unusually laid-out golf course in England. Hazards, bunkers, and obstructions of all sorts, abound on this oddly constructed course, but in spite of these handicaps, it is said, a very good game is being attained. In this country, the chief hazards are sand pits, water, or uncut grass, called "the rough," and these are found upon the fairways, or in other words, the distance between the putting green of the hole ahead and the tee from which the player is driving. The putting greens are always kept smooth and free from anything that would deflect the course of a ball. The freak course in England, however, has tees elevated on boxes, and on the fairways are found nets with a small hole in them, through which the ball must be lofted. Wire screens and bushes are placed on the putting greens, as well as wooden-trough arrangements, which make it a very difficult task to get the ball in the hole. Those who follow the game of golf will readily appreciate the trouble that would be encountered in overcoming these unusual handicaps.

This Greatly Elevated Tee Is a Very Unusual Hazard, and Is a Test of the Golfer's Ability at the First Shot of the Game



Here is Seen a Net through Which the Ball must be Driven, and Which Requires Accurate Driving with Mashie or Iron Club





View of One of the Putting Greens, Showing a Wooden-Trough Arrangement Which Makes This Hole Very Difficult to Play. Left: The Putting Green, Which is Usually Kept So Smooth and Free from Any Obstructions, Here Has a Wire Screen and Bushes upon It

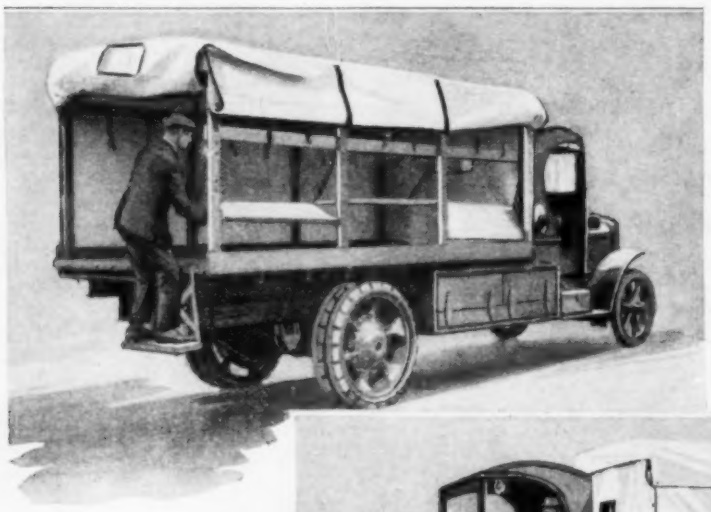
SIMPLE BULK-GRAIN LOADER IS INEXPENSIVE

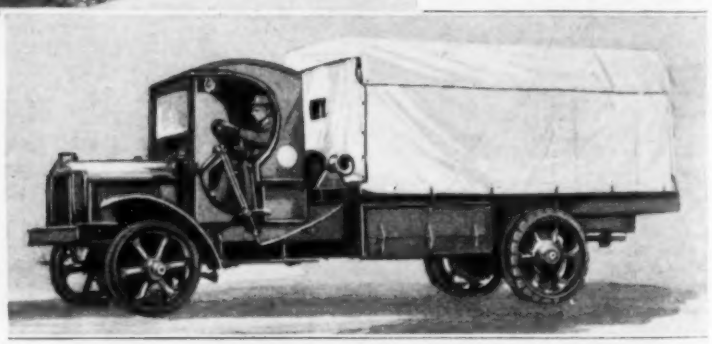
Simple, inexpensive equipment for loading bulk grain into railroad cars is provided by a lately developed conveying apparatus. The loader does not provide storage space. Grain is dumped into a concrete pit, from which it goes through a regulating gate into the elevator boot. Here a bucket and belt conveyor picks it up and carries it to a hopper at the head of the elevator shaft. From the hopper the grain is carried through a metal pipe and flexible loading spout to the car, the spout serving as a nozzle to distribute it. Power for driving the conveyor is furnished by a small gasoline engine. The equipment can be installed where the expense of an elevator would be prohibitive. It is made in sizes to handle either 1,000 or 2,000 bu. an hour.

Loading a Box Car with Bulk Grain by Means of a Simple New Conveyor Device: It is Made in Two Sizes, One Handling 1,000 and the Other 2,000 Bushels an Hour, and Is Inexpensive to Operate

TELEPHONE-REPAIR TRUCK WITH NOVEL FEATURES

Several novel features are incorporated in a repair motor truck designed for a Pacific-coast telephone and telegraph company. The truck, behind the driver's cab, is of ample dimensions and can be completely inclosed with curtains. It has seats for workmen, removable so that it can be used also for transporting freight. Behind the cab is a winch operated by a crank at the side of the cab, which is used for winding or unwinding cables. These pass under the truck to the rear, where they are guided by a pulley and guide plates.





A Telephone and Telegraph-Repair Motor Truck, That can be Completely Inclosed with Curtains, as Shown to the Right, and Has Removable Seats for Workmen So That It can be Used as a Freight Truck, as Shown Above: Behind the Driver's Cab Is a Winch for Winding Cables

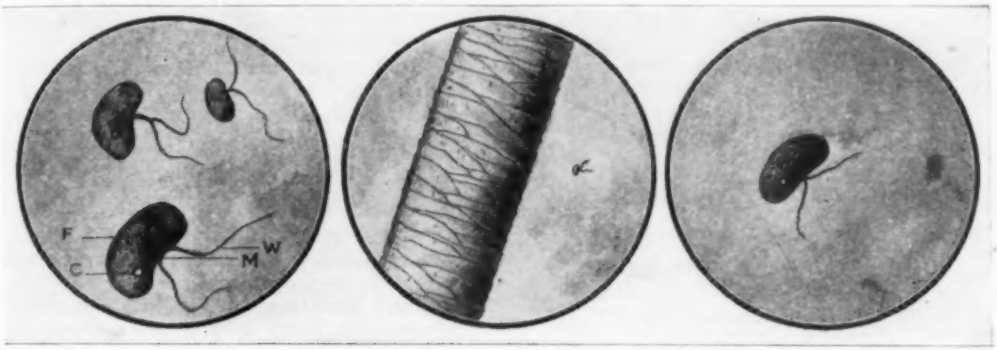
CAPTURING THE SMALLEST ANIMAL IN THE WORLD

By LEON AUGUSTUS HAUSMAN, Ph. D.

WE have become a bit blasé, during recent years, to accounts of animals of prehistoric existence, whose dimensions dwarfed those of our present animal forms. Possibly then, our wearied enthusiasm for the unusual in zoölogy may be revived by a report of the capture and study of a creature which, in size, stands at the other extreme from the titanic dinosaurs of yore.

The smallest speck which can be detected by the average unaided eye, is a bit of opaque, white substance, about 50 microns (.002 in.) in diameter, seen against a black background. But the creature here under consideration is only one-twenty-fifth of this size. A graphic idea of its extreme smallness can be had by comparing it with the ordinary human hair. In Fig. 2 is shown this, the smallest animal in existence, compared with a human hair, ordinarily averaging 50 microns in diameter. This diminutive creature, however, rejoices in a name which yields nothing in length and impressiveness to the appellations borne by the mightiest dinosaur science has to offer, for it trails after it the resounding cognomen of *Pleuromonas jaculans.*

In diameter, along the longest axis, its body rarely reaches a length of eight or nine microns (about $\frac{1}{3,000}$ of an inch), and the writer has often found individuals as small as two microns ($\frac{1}{12,000}$ of an inch).



Figs. 1-3. Microscopic Views of the Smallest Animal in the World: Left to Right, Varying Shapes of Its Body, W Being the Whips or Flagellums; M, Mouth; C, Organ of Excretion, and F, Food Particles; Single Specimen beside a Piece of Human Hair, and a Specimen Photographed through Microscope

Figure 1 shows three typical individuals. The body is somewhat the shape of a kidney bean, with two long whiplike threads extending from a depression in one side. With these whips, known as flagellums, the creature makes its rather jerky way through the water in search of food, for it lives in pools and ponds amid decaying vegetation, where an ample supply of bacteria and juices from the disintegrating plant tissue is always present. These serve as its food, which is absorbed into the soft jellylike ar[illegible] at the base of the flagellums. The life of a single individual is usually but a few hours. At the end of that time the creature simply divides into two new individuals, both of which swim away, feed, and increase in size, and then themselves divide, and so on.

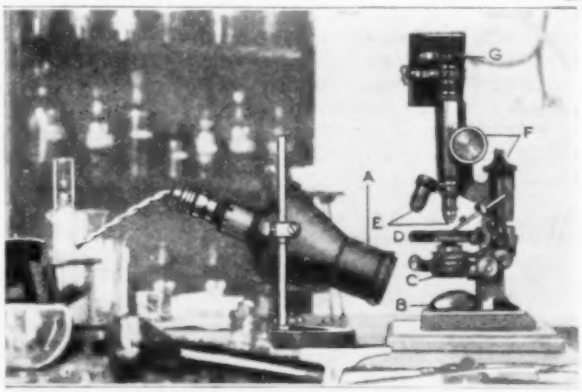


Fig. 4. The Compound Microscope for Extremely Minute Work That was Used in Obtaining the Three Views Shown in the First Illustration: A Is a Tungsten Lamp of High Power; B, the Microscope Mirror; C, the Condenser; D, the Stage; E, Objectives; F, Focusing Screws, and G, the Ocular or Eyepiece

In Fig. 3 is shown an unusual photograph of this most minute animal form of which we have record, magnified many thousand times.

The capture of Pleuromonas, while not involving any of the risk to life and limb which attends the capture of our largest living animal forms, the whales, still involves as great time, patience, and perseverance on the part of the "hunter." In Fig. 5 is shown the apparatus, devised by the author for the capture of the protozoa (the first great division of animals to which Pleuromonas belongs), under the microscope. By skillful manipulation of the tip of the pipette under the objective of the microscope, it is possible to secure single individuals of Pleuromonas, and to transfer them either to glass microscope slides or to sterilized-culture jars, to breed a new race. And many failures, either to capture or to transfer these tiny animals from one place to another, is the lot of the hunter after the smallest animal in existence.

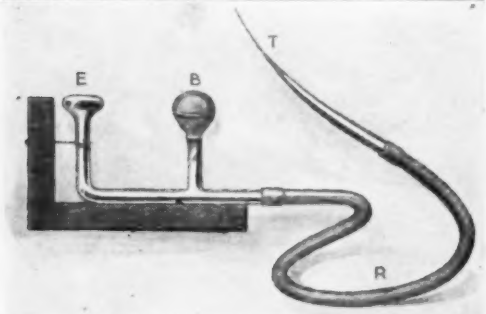
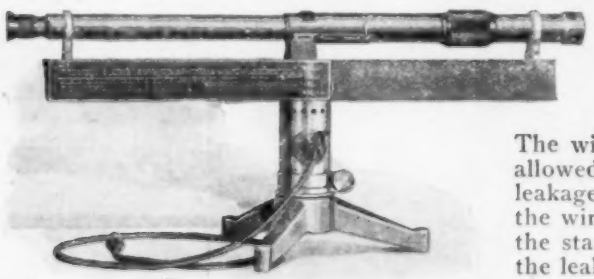


Fig. 5. Capturing the Pleuromonas: Laying Finger Tip on End, E, Heats Air, Driving Some through Tip, T, Which is Then Inserted into Water Drop under Microscope. Removing Finger Cools Air, Drawing into Pipette Water with One of the Creatures. Pressure on Rubber Bulb, B, through Tube, R, Deposits Object Where Desired

Pleuromonas claims our interest, not only because it is the most minute form of animal life known to exist on our earth today, but because it is of actual economic value to us as well. Often bodies of water filled with putrefying plant remains will be colored a milky hue by the immense numbers of these tiny creatures, each one of which is a valuable scavenger, helping to transform decaying vegetable tissue into animal substance. The Pleuromonas are devoured, in their turn, by larger forms of the protozoa, or single-celled animals, which again are eaten by minute crustacea and insects. And these last constitute one of the most important supplies of fish food. In many cases, therefore, these tiniest of nature's children are the ones to take the first step in the great work of making many of our waterways sweet and pure.

COLORS ARE NOW NUMBERED, MEASURED, AND MATCHED

By a new method of analysis, colors can be designated by a series of numbers after they are matched, and these numbers are then recorded, so that an exact duplicate of the color can be produced at any future time. The instrument used is called a colorimeter, and is intended for use in the factory or laboratory, for the matching of colored materials and liquids. In operating, a white light from a standard lamp illuminates one-half of the field of view, and the color to be matched appears in the other half. By means of sliding gelatin wedges which are colored red, blue, green, and neutral gray, the color primaries are subtracted from the white light until the other color is matched.



At the Top Is the Eyepiece, and Suspended from It Are the Sliding Scales Designated G, B, R, and N, Meaning Green, Blue, Red, and Neutral. Below Is the Cord Attachment for Any Light Socket

WOODEN-STAVE PIPING SHOWN TO BE FIRE-RESISTING

Creosoted wooden-stave piping, bound with galvanized steel wire, which formed part of a main, in Seattle, Wash., carrying water at a pressure of 125 lb. per square inch, was demonstrated by test to be fire-resisting. The test section, completely covered with fine kindling saturated with kerosene, was ignited. The wiring expanded with the heat, and allowed the staves to separate, causing a leakage which extinguished the fire. As the wiring cooled, it contracted and drew the staves together again. In four hours the leakage had entirely stopped.

¶ Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information.

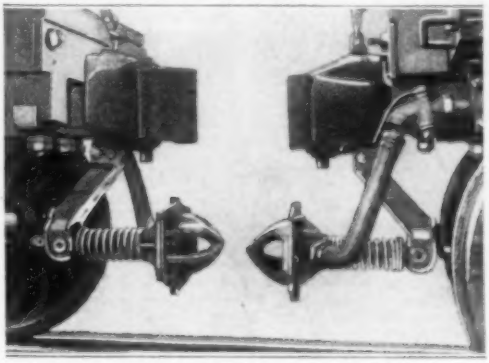
A Stack has Just been Completed and Slipped Out of the Bin of the New Hay-Stacking Machine. One of the Rear Gates Is Still Open, but the Nearer One has Swung Shut. The Sloping Sides of the Bin Give the Stack the Necessary Pitch to Shed Water When It Rains

HAY-STACKING MACHINE SAVES MUCH TIME AND LABOR

Harvesting hay is said to require only about one-fifth of the ordinary amount of labor with a new machine, operated by six horses and two men. The hay is picked from the ground and passed to the top of a bin by a conveyor. Three sides of the bin are solid, but the rear consists of two self-closing swinging doors. The bottom, carried 6 in. above the ground, is made of slats running lengthwise. When the bin is full, a trip lever releases a support at the rear of the bottom slats, allowing them to drop to the ground. Contact with the ground causes the stack to slip from the slats and push open the rear gates as the machine passes on. Springs return the slats to position when the stack is clear.

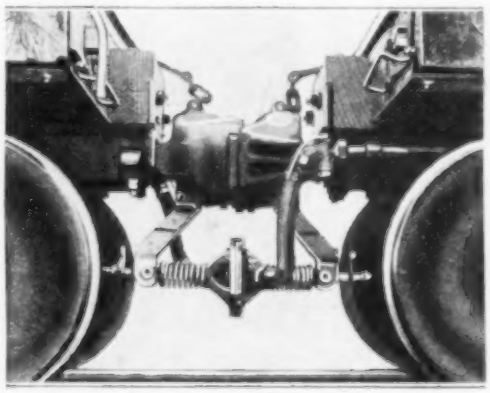
AUTOMATIC HOSE COUPLERS FOR RAILROAD CARS

It is generally admitted that the present method of coupling by hand the hose on railroad cars is objectionable, if for no other reason, on account of its danger to the life and limb of the operator. Therefore it is not surprising that there are many attempts being made to couple the hose automatically in the same manner as the cars themselves are now coupled. An automatic hose coupler that has been submitted to long and very severe tests on several railroads, is of quite simple construction, and has points about it that resemble the present standard car coupler. It is attached to a lug that is cast, or welded, to the car coupler, making a permanent union with it. It consists of only six parts and weighs 50 lb. It is made for connecting the air hose of freight cars, and on passenger cars to connect signal and steam as well as air. The one point where failure might occur is in the coil springs that keep the



Freight Cars Fitted with the Automatic Hose Couplers About to be Coupled by Impact, When Cars and Hose will be Coupled Simultaneously

couplings pressed together, and the construction is such that upon failure of one of these springs the coupling becomes



After the Impact, Showing the Freight Cars Coupled Automatically without Any of the Assistance from a Trainman That Is Necessary with the Ordinary Method

self-locking, and is not blown apart by the air pressure. This is demonstrated by connecting a coupling devoid of any springs. Under 120-lb. pressure the connection is maintained, and there is no air leakage.

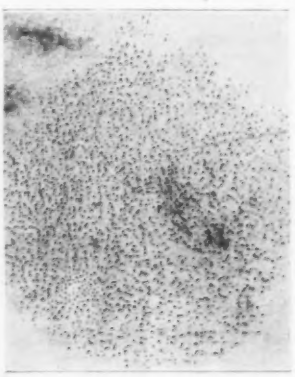
A very interesting demonstration of this hose connector is made by a model, with a traveling track that moves at high speed, and subjects the coupling to the stresses of very sharp curves and steep grades.

IMPROVEMENTS IN DETECTION AND IDENTIFICATION MEANS

Constantly, the methods of human identification, and also the analysis of handwriting, are becoming more and more precise. In connection with the Bertillon method of identification by means of finger prints, several recent developments have occurred, one of the latest being the inclusion of the sweat pores as an element of identification. Experiments in this connection, in France, have shown that when these finger prints are examined under a microscope there are plainly seen a series of spots in single or double lines, which were formed on the print by drops of moisture from the sweat glands. The number of these dots varies from 9 to 18 to the centimeter (.4 in.), and their position, and even their shape, which may be either round, oval, or curvilinear, are absolutely characteristic in each individual. It is indisputable therefore, that this is an exact method of identification, for the number and the disposition of these pores are constant in the same individual from the day of birth to death. Moreover, no matter in what manner the print is taken, whether with the finger flat or rolling, the pores have the same relative position and shape. These prints are not made with ink, but with dry graphite, or light powders, such as black oxide of copper or white lead. Besides taking direct prints, the finger tips are photographed by means of a microphotometric apparatus, and the photographic and direct prints are compared. The most striking feature in connection with this method of identification is that even when a malefactor has taken the precaution of wearing gloves, an imprint of any part of the wrist or arm is sufficient for identification.

PHOTOS BY COURTESY OF LA NATURE

The New Method That Permits Identification by Means of the 96 Sweat Pores Notated



Imprint of Sweat Pores on Forearm Used for Identification When Culprit Wears Gloves

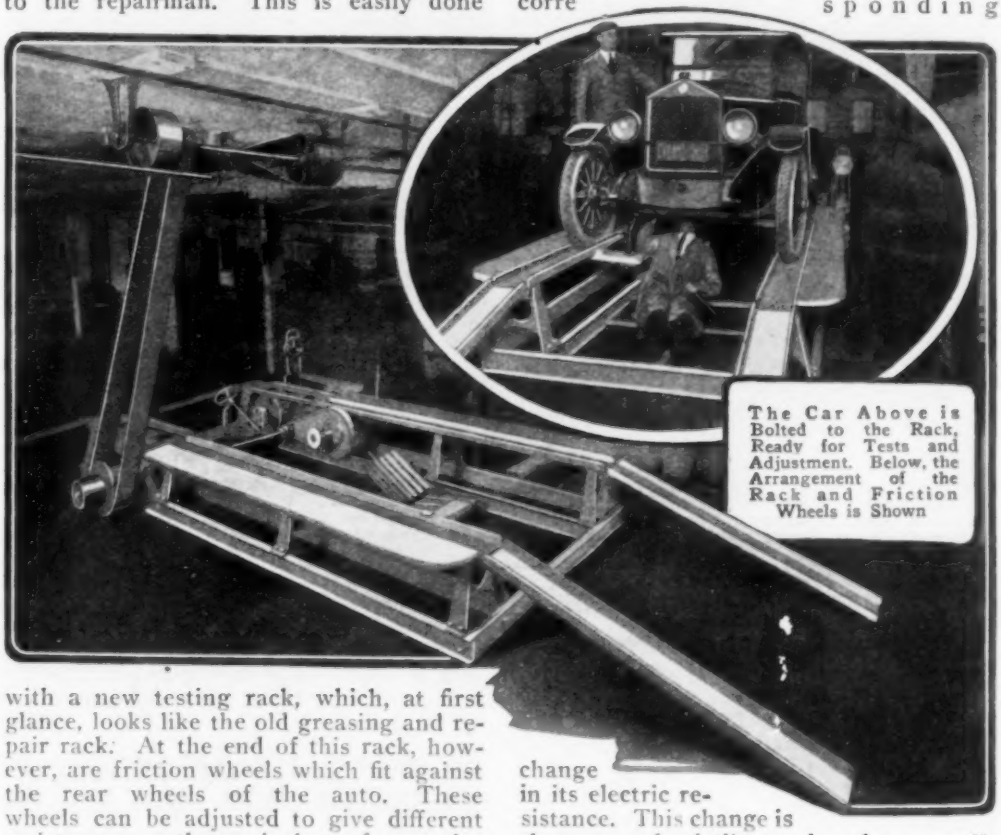
As regards the detection of counterfeit handwriting a method has been worked out that is both mathematical and scientific. It has been applied to the detection of freehand forgeries—not those made by tracing or the changing of letters which are easy to detect. It is based on the hypothesis that everybody's handwriting shows certain constants that can be measured. This method is called graphometric, and on enlarged photographic reproductions measurements are made of the height of the letters, the trace of the curvature, the slope of the downstroke, and other details, and they are compared with standards that have been established by a study of the genuine handwriting.

In Lowest Tier Are Samples of Authentic Writing; Above Are Forgeries

¶Political candidates were given a chance to do their electioneering by wireless in a recent mayoralty contest in Pittsburgh, Pa. Persons possessing a radio outfit could hear the aspirants tell why they should be elected, without leaving home. Each candidate was allowed a five-minutes' speech at the sending station.

AUTOS GIVEN ROAD TEST IN GARAGE

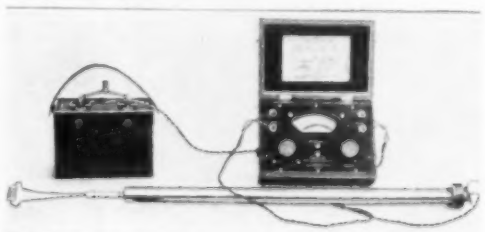
Giving a car a road test without taking it out of the garage is a great advantage to the repairman. This is easily done with a new testing rack, which, at first glance, looks like the old greasing and repair rack. At the end of this rack, however, are friction wheels which fit against the rear wheels of the auto. These wheels can be adjusted to give different resistances, so the equivalent of a regular road test can be given. Gauges are attached to indicate the mileage and horsepower developed. The friction wheels can also be connected to an electric motor, and the auto engine driven by this power, if desired.



The Car Above is Bolted to the Rack, Ready for Tests and Adjustment. Below, the Arrangement of the Rack and Friction Wheels is Shown

INSTRUMENT RECORDS EFFECTS OF AIR IN FURNACE GASES

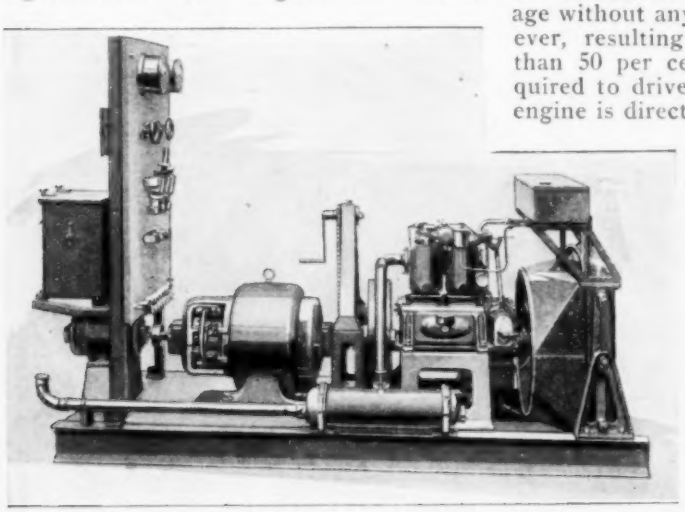
A new instrument called an "oxyscope," now in use in England, indicates the oxidizing properties of the atmosphere in a furnace. It furnishes a means for determining the amount of air that should be admitted to the furnace so that the proper temperature may be maintained in processes of heat treatment of materials. There are three parts of the instrument: a mounting that holds the oxidizing element that is introduced into the furnace; an indicator box to which this is wired, and another box that holds a two-cell battery for furnishing the current. By the admission of more or less air into the furnace, the temperature of the oxidizing element varies, and therefore brings a corresponding change in its electric resistance. This change is shown on the indicator box by a needle that deflects along a graduated arc, as in an ammeter. If observations of the position of the needle are made at regular intervals of about one-half minute, the deflections of the needle will tell the rate at which the oxidation progresses can be determined, showing the oxidizing properties of the furnace gases.



Instrument That Shows Oxidizing Properties of Furnace Gases: In Front Is the Oxidizing Member for Insertion in the Furnace, behind It, the Electric Indicator Box, and Also a Two-Cell Battery

ARC-WELDING OUTFIT HAS NOVEL CURRENT CONTROL

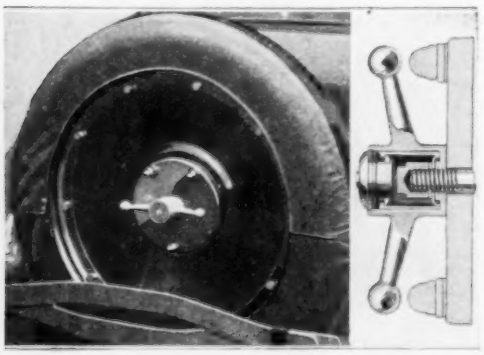
A compact, portable electric arc-welding outfit has been designed and built in England, which, it is stated, distributes the current at the required welding voltage without any mechanical control whatever, resulting in a reduction of more than 50 per cent of the horsepower required to drive the dynamo. A gasoline engine is direct-connected to the dynamo, which is so constructed as to supply a constant current regulated by a variable rheostat. When used for welding, the dynamo is connected with the arc through a special reactance coil in the main circuit, which damps out any sudden rise in the current, and also helps momentarily to build up the current when any sudden break takes place. This plant, with switchboard, all mounted on a substantial base, weighs 2,800 pounds.



Electric-Welding Plant Which, with Switchboard, Dynamo, Rheostat, Reactance Coil, Gasoline Engine, and Its Accessories, Mounted on a Substantial Base, Forms a Very Compact and Easily Portable Outfit

CARRIER LOCK FOR SPARE DISK OR WIRE WHEELS

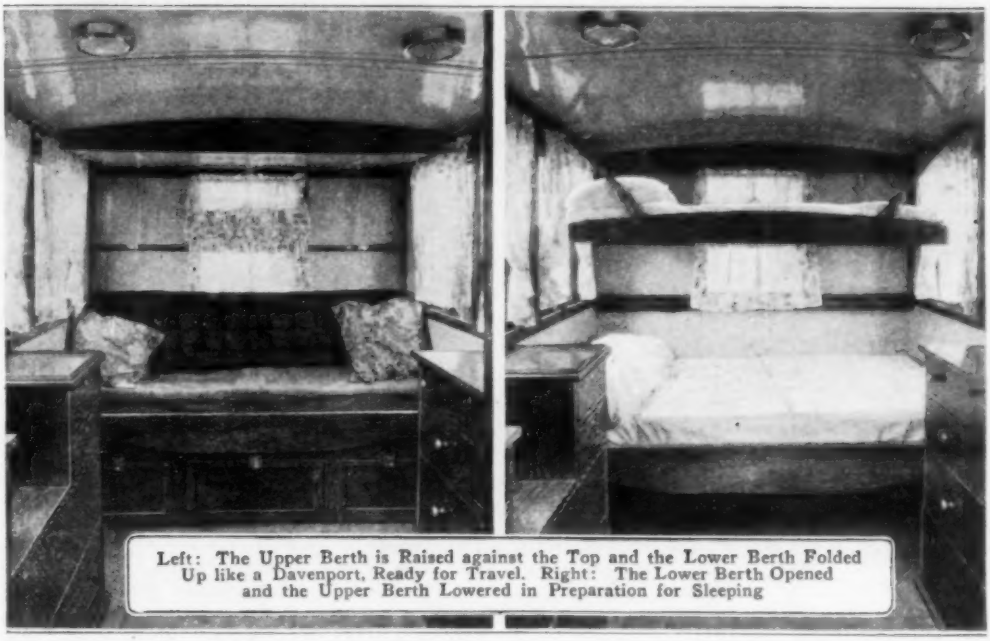
Adequate protection against spare-wheel thieves is afforded by a new lock designed for use with wheels of the disk or wire type. This lock can be installed, with the aid of ordinary tools, on any spare-wheel carrier in a few minutes. It consists of three parts, a housing, with two wing arms, made of aluminum alloy and reinforced with a hardened steel insert, a combination locking nut and washer, fitting the threaded stud of the wheel carrier, and a removable, nonpickable, dust-proof lock, which fits into the outer end of the housing. Two movable lugs, inside, engage a flange and hold the lock in place. The device can be quickly unlocked, by means of a key, and the wheel dismounted.



Left: A Disk Wheel Locked onto the Carrier with the New Lock. Right: Detail of Lock Construction, Showing the Barrel-Shaped Lock Housing

HIGHEST RAILROAD OF BRITISH EMPIRE TO CROSS RICH REGION

The highest summit level of any railroad in the British Empire, 9,135 ft., will be attained by a new 150-mile line about to be built from Nakuru to Turbo, in British East Africa. Cutting through the heart of a rich agricultural plateau and extensive timber lands, it will form a part of a great trunk route from Mombasa on the Indian Ocean to Uganda and the Congo. Later, when the Cape-to-Cairo project becomes a reality, it will be one of the ribs of this route. The rise from Turbo, the lowest point on the line, to the summit will be 3,215 ft. Only 14 per cent of the line will be on the level, and 48½ per cent of it will consist of curves. Construction work is expected to occupy three years. The plan is to maintain an unskilled labor force of 10,000 natives. The cost will be about $10,000,000, according to present estimates, though in view of falling prices, this figure may prove to be too large.



Left: The Upper Berth is Raised against the Top and the Lower Berth Folded Up like a Davenport, Ready for Travel. Right: The Lower Berth Opened and the Upper Berth Lowered in Preparation for Sleeping

BERTHS ADD TO THE COMFORT OF AUTOMOBILE TOURING

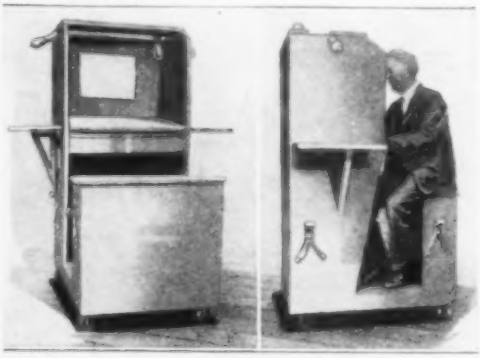
A berth arrangement built into the rear of an automobile used for extensive touring affords two comfortable beds, but does not take up an unnecessary amount of space when not in use. One berth is built like a davenport against the back of the car. The other is supported against the top by hooks, during the day, and at night is lowered in a manner similar to a sleeping-car berth. In order to provide ventilation for the upper berth, the rear window of the car extends above the berth when it is lowered. A special bathtub is carried in a compartment under the lower berth.

WILD GEESE ARE ELECTROCUTED IN VIOLENT ELECTRIC STORM

Although it did not "rain pitchforks," or "cats and dogs," a recent electric storm near Seattle, Wash., was featured by the queer occurrence of "raining geese." After an unusually dazzling flash of lightning, followed by a loud clap of thunder, great numbers of wild geese fell to the ground. Passers-by and residents of the vicinity took advantage of the phenomenon and immediately gathered up the fowl, which were dead and without a mark of any kind upon their bodies to indicate the manner of their death.

PORTABLE EXPRESS OFFICE FOR FAIRS AND EXHIBITS

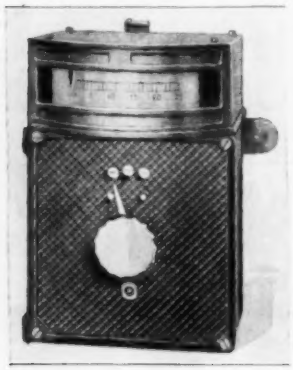
For convenience in handling shipments at fairs and exhibits, an expressman has introduced a portable booth, to be used as an express office. Being equipped with small wheels, it can be readily pushed where needed, and if the going proves too rough, brackets, into which handles may be slipped, are provided for carrying it. The booth is fitted with a drawer for supplies, a seat for the expressman, and also a collapsible writing shelf on each side for the shippers' use. Wiring and fixtures for electric lights, with a simple connection which can be attached to any light socket, are also installed.



Two Views of the Portable Express Office, Showing How It Appears from the Rear and from the Side

CARBON DIOXIDE IS MEASURED BY ELECTRICAL INDICATOR

An instrument for measuring the percentage of carbon dioxide in flue gases, is being manufactured in Europe. Two coils of platinum wire, of the same size, are inclosed in separate gas-filled cells in a metal block.



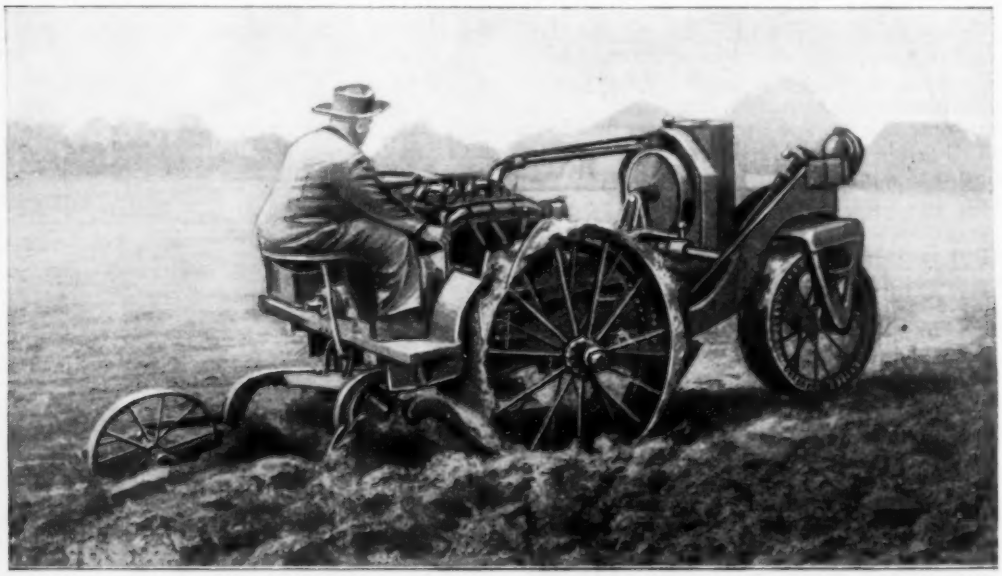
Each coil is connected to form one arm of a Wheatstone-bridge circuit, and when an electric current is allowed to flow in the circuit the coils become heated. Heat is conducted through some gases more readily than others, and when one of the cells is filled with pure gas, and the other with the flue gas to be examined, the difference in radiation of the two cells determines the percentage of carbon dioxide in the flue gas. This percentage is proportional to the deflection of the galvanometer needle, and it is a simple matter to calibrate the galvanometer scale so that it indicates this percentage directly without calculations.

MICROMETER GIVES METRIC AS WELL AS INCH READINGS

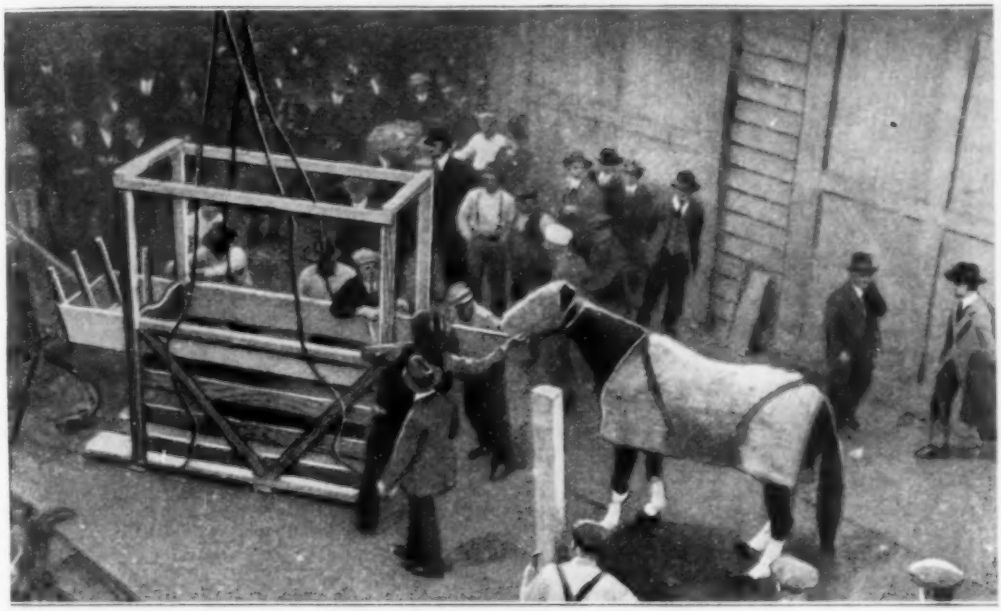
Both inch and metric readings can be made simultaneously on a micrometer that has been introduced in England. On the stem of the micrometer, besides the usual inch graduations, there is another line of graduations with metric divisions that spirals once around the stem without crossing the inch graduations. On the thimble is the ordinary set of graduations for reading the inch measurements, and a second set for the metric readings.

NEW FARM TRACTORS HAVE THREE-WHEEL DRIVE

Three-wheel-drive farm tractors, built by a middle-western concern, are credited with a number of advantages by the makers. Power, from a 35-hp. motor, is applied equally to the single front wheel and the two rear wheels. A swivel joint on the front wheel allows the tractor to make a very short turn and plow well into the corners of a field. Power on the front wheel is said to increase the efficiency of the machine, particularly in climbing hills, pulling out of ditches, and working over soft ground. A belt pulley, operated independently of the driving mechanism, does not drag on the power supply when not in use. Steering controls may be operated either by hand or by power.



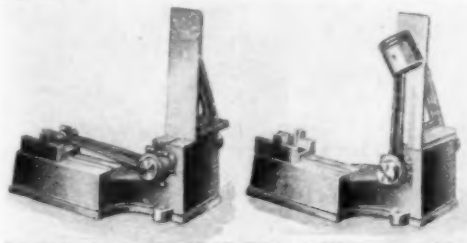
Plowing with the New Three-Wheel-Drive Farm Tractor: The Plows are Set Directly below the Driver's Seat So He can Observe Their Action and Place Any Part of the Tractor's Weight on Them. The Depth can be Regulated from Two to Fourteen Inches



At the Left are Shown the Stall, or Crate, and the Derrick Cables with Which the Crate was Hoisted aboard Ship. Before the Horse could be Induced to Enter the Crate, His Head had to be Covered with a Sack

CRANKSHAFT AND PISTON JIG OF UNIVERSAL QUALITIES

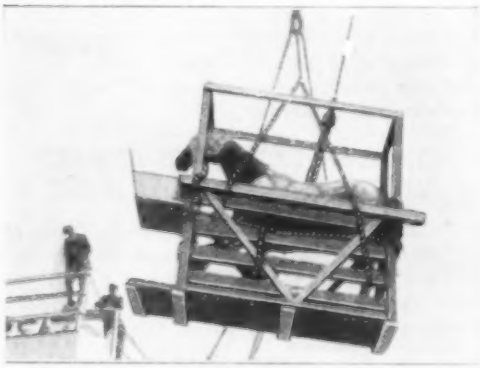
Those interested in automotive repairing will welcome a universal jig to be used in the alinement of crankshafts and pistons. The jig has three arbors, or shafts, all of the same size in the middle, but whose ends are cut down to standard crankshaft sizes, each end containing two sizes, so that 12 sizes of crankshaft can be accommodated. A sliding block at one end, to provide for different-length pistons, and a square at the other end, both move on accurate planes and are held in place by a tongue-and-groove arrangement. The total weight of the jig is 125 lb., and it is made so that it can be bolted solidly to a bench. It is claimed that this tool will handle more than 90 per cent of the truck and automobile crankshafts now made.



Left: Piston Shown Placed on Sliding Block. Right: Piston Alinement by Sliding Square

HORSE TAKEN ABOARD STEAMER IN SPECIAL STALL

Horses are notoriously nervous and object to boarding cars or ships. So, when a thoroughbred animal was to be taken aboard the liner "Empire State," at

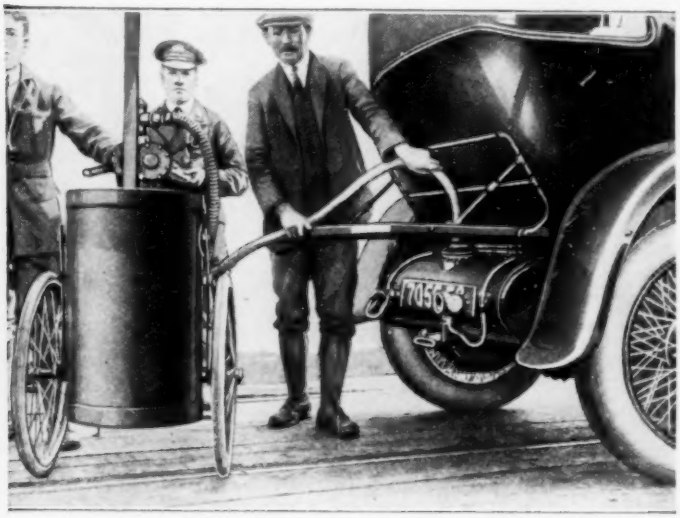


This Shows the Crate and Horse in Mid-Air as the Animal was being Lifted Bodily aboard the Ship. The Sack is Still Tied over the Eyes of the Horse

San Francisco, Calif., for a trip across the Pacific, a stall had to be provided for it. A light box stall was built on shore, and the horse was driven into it blindfolded. Then, with the horse in it, it was hoisted aboard the ship. Because the stevedores had difficulty in getting the horse into his stall, the sailing of the vessel was delayed for some little time.

SUCTION PUMPS EMPTY MOTOR GAS TANKS BEFORE SHIPPING

Tanks, equipped with suction pumps, are being provided by the British automobile association and motor union to empty the gasoline tanks of automobiles about to be taken aboard ships at British ports. The shipping authorities require that all tanks must be drained before motors can be shipped. When tanks are drained from the bottom, in the usual way, the gasoline is often spilled, with dangerous results, and the new pumps are for the purpose of avoiding this danger.



Emptying the Gasoline Tank of an Automobile to be Taken aboard Ship at Folkstone, England: These Suction-Pump Tanks are Mounted on Rubber-Tired Wheels and are Easily Moved about the Docks

CHINESE PRINCE IS AFRAID TO RIDE IN AUTOMOBILE

In sharp contrast to the establishing of an 800-mile mail and passenger-airplane service by China, and its interest in other modern activities, is the experience of a party of Americans on a trip from Peking to the Ming Eastern Tombs by automobile. A Manchu prince, who met them at the tombs, was greatly frightened when the American automobile, the first he had ever seen, appeared. He could not overcome his terror sufficiently to accept an invitation to ride, and withdrew to a safe distance. The members of his bodyguard, armed with broadswords and even bows and arrows, were both terrified and fascinated by the car.

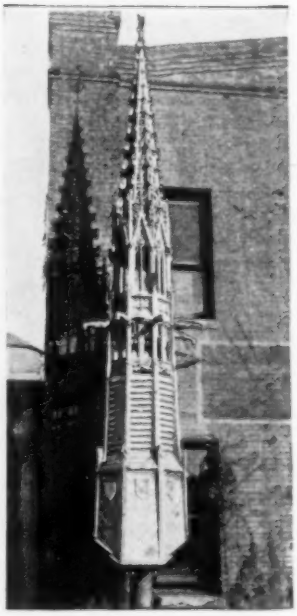
¶ Our Bureau of Information is for your benefit. Use it as often as you please.

PERMANENT EXPOSITION FOR CANDY INDUSTRY

Candy makers and manufacturers of candy-making machinery have rented the entire second floor of a large Chicago office building, and are conducting a permanent exhibit for the benefit of the wholesale buyer, the retailer, and the manufacturer of any kind of "sweet-tooth" goods. Here, the prospective buyer of candies, or of machinery to make the same, may come, and be saved the tiresome task of going about the city, or the more costly one of traveling around the country, to look at the displays of the many manufacturers. The various kinds of machinery used to supply the American public with their favorite sweets, are shown here in an amazing array, and anything from the penny "all-day sucker" to the glistening soda-fountain fixtures, may be purchased at the exhibit.

ORNAMENTAL BRONZE TOWER FOR MEMORIAL CHAPEL

An ornamental bronze tower, 25 ft. in height, is the product of a Minneapolis firm, and will be shipped to St. Louis, to be mounted upon a memorial chapel there. Although the tower is composed of many pieces, the joints and rivets are seen only from the inside. Thus the work appears to be a solid piece of bronze.



Arsenic-Refining Plant at the Little Town of Brinton, Virginia, Which has Grown Up around It as a Result of This Activity: This Is the Only Refinery in the United States, and Perhaps in the World, That is Operated Primarily for the Production of Arsenic, Which Is Usually a By-Product of Minerals

MINING AND REFINING ARSENIC IN VIRGINIA

By PHIL W. HANNA

SEVERAL years ago, a farmer in the foothills of the Blue Ridge Mountains, in Virginia, cleared a new field for pasture. Before long his cattle became sick and one of them died. Thinking that the trouble might be caused by the water from a spring in the field, he had it analyzed. It was found to contain a large amount of arsenic, and the discovery resulted in the development of an arsenic mine and refining plant. This plant, at the little town of Brinton which has grown up about it, is the only one in the United States, if not in the world, which is operated primarily for the production of arsenic. Other refineries produce it as a by-product in refining silver, antimony, and a number of other ores. Most of those in this country are located in the mining districts of Utah and Montana. The arsenic usually appears in the ores in combination with iron as a pyrite called arsenopyrite. Pure arsenic is a steel-gray metallic substance, but it is better known in the form of an oxide, the white arsenic usually produced by the refineries.

At Brinton the ore is found in many small veins, through a gray mica-quartz formation. When taken from the mine, it is put through a crusher and then placed in an iron tube, 50 ft. long and 6 ft. high, known as a calciner. Here it is subjected to a heat of 800° F. for 45 minutes. The resulting gases deposit the arsenic, in the form of arsenious oxide, on baffle plates in a flue, 319 ft. long, which leads from the calciner and ends in a tall stack. The deposit, a dirty-gray powder full of impurities, is then placed in a refining furnace which volatilizes 1,400 lb. in about 2½ hours, producing the pure oxide. This is ground to a powder and placed in barrels by an automatic machine, after which it is ready for shipment.

White arsenic, as this arsenious-oxide product is called, is used chiefly in the manufacture of glass, for making insecticides such as Paris green and poison fly paper, for weed-killing compounds, for a sheep dip, and for medical purposes. It was formerly used extensively in a copper compound for coloring wall paper, cloth, and toys, but has been replaced by other less dangerous coloring matter for these purposes. Contrary to what might be expected, work in the arsenic mine or refinery has no ill effect on the workmen, in fact employes seem to be benefited physically by service in the refinery.

Though arsenic is poisonous, both in the metallic form and in most of its com-

pounds, a relatively large amount must be taken to be really dangerous. Arsenic poisoning results in irritation of the eyes, soreness of the mouth, skin eruptions, spasms, vomiting, and even paralysis. Taken in small doses, a tolerance for it can be established. Some people, notably the Styrians of Austria, develop the arsenic-eating habit, which is said to result in increased weight, strength, and appetite, and a clear complexion. It is often given to horses, in Europe, to improve their coats and make them plump and spirited. It is this quality which makes it valuable as a medicine in treating anemia and dyspepsia, its principal medicinal use. It is also used for certain skin diseases. Great care must be taken in prescribing it, as its effect on different individuals varies greatly.

White Arsenic or Arsenious Oxide Piled Up Waiting to be Barreled, at the Brinton Refinery: This White Powder Is the Form in Which Arsenic is Usually Obtained for Commercial Purposes

About 10,000 tons of arsenic are used annually in the United States. Of this amount about 4,000 tons are imported. Most of the imported arsenic comes from Canada, Mexico, and Belgium, but small amounts are also obtained from England, France, and Germany.

CIGAR LIGHTER FOR AUTOISTS WINDS UP ON SPRING REEL

The drivers of motor cars will welcome a handy electric lighter, which is now on the market as an automobile accessory. The autoist needs use only one hand in lighting his cigar, and after being used, the appliance winds itself up on a spring reel.

This Shows the Cigar Lighter being Used with One Hand without Removing the Other from the Steering Wheel. When the Lighter is Released, the Cord Winds Up on a Spring Reel

NEW AIR-CRAFT FITTINGS AND WHAT THEY ARE MADE OF

Steel shapes or fittings, required in the modern airplane to hold its various parts together, show the new demands which an invention may make, and to supply which the ingenuity of scientists and skilled men of various industries is demanded. Air-craft fittings made of steel, to be used on large machines, such as the NC's of transatlantic fame, are typical of the many structural parts which are used to connect, support, and reinforce the members of modern airplanes. Early airplane fittings were made from low-carbon sheet steel or a grade of mild alloy steel. The new giant planes, however, require a steel of high tensile strength, to avoid excessive thickness and weight. Steel of a tensile strength of 150,000 lb. per square inch is necessary.

Airplane Wing-Beam Hinges, in Various Stages of Completion, are Shown at the Left. The Smaller Forms at the Right Are Parts of a Box Fitting. After Welding, These Forms are Dip-Brazed and Heat-Treated. They must Have Great Strength and Resiliency, the Box Fitting, for Example, Carrying the Stresses from 10 Timbers

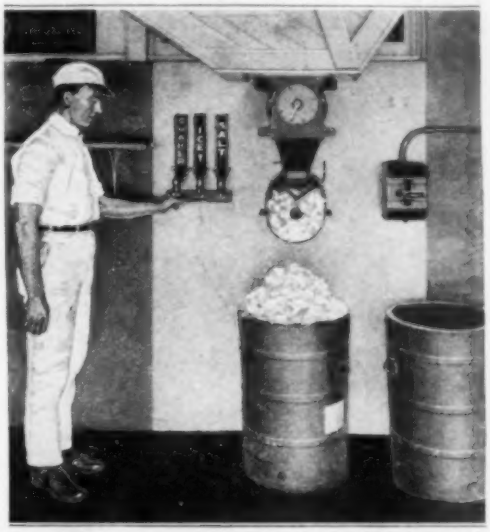
It has been found that steel having about one per cent of chromium and less than a quarter of one per cent of vanadium meets the requirements. Such a steel can be rolled successfully into sheets of the proper thickness and pliability to make the shapes, and at the same time of sufficient strength to withstand the tremendous strains to which they are subjected.

ARCH OF BRIDGE IS ERECTED WITHIN TWENTY-FIVE DAYS

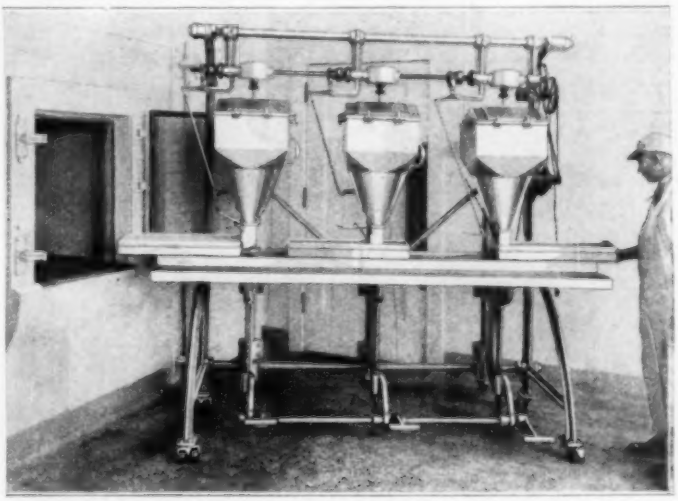
Great speed in construction was attained in the building of a 97-ft. concrete arch for a bridge in Maryland recently. The bridge spans the Little Patuxent River, near Savage, and carries the heavy traffic of the Washington Boulevard, which runs from Baltimore to Washington, D. C. Being a steel structure originally, it was wrecked by the driver of a heavily loaded five-ton truck, who disregarded the "One-Way-Bridge" signs, and attempted to pass a small car on the bridge. The two vehicles collided, which resulted in the tearing out of enough of the side supports of the structure, to allow it to collapse in the river. The State Roads Commission met the next day and called for bids on the cost of replacing the wrecked arch, and within 30 days' time, the contract was awarded at a figure of $19,000, and work was started in five days after the accident. The wrecked steel arch was replaced by one of concrete, in 25 days, and the feat is considered quite an achievement in bridge construction.

NEW ICE-CREAM MACHINES ARE SANITARY AND ECONOMICAL

Two new machines, for use in the manufacture of ice cream, greatly aid sanitation as well as increase the speed of production. One of them replaces the old hand method of making brick ice cream, turning out the molds without the touch of human hands. It can be adjusted for any size of brick, made in from one to three flavors. The capacity is 20 gal. of plain, or 12 gal. of three-layer brick, a minute. Layers produced by it are always equal in thickness and separated by a straight, even line, making a more beautiful brick than was possible by hand methods. The second machine is for packing tubs. Ice is crushed in a hopper, by an electrically operated rotary cutter, and delivered to the tubs with any desired proportion of salt, by moving a lever. This device has packed 199 tubs in an hour, with only one man to attend it. Formerly six men would have been required for this job.



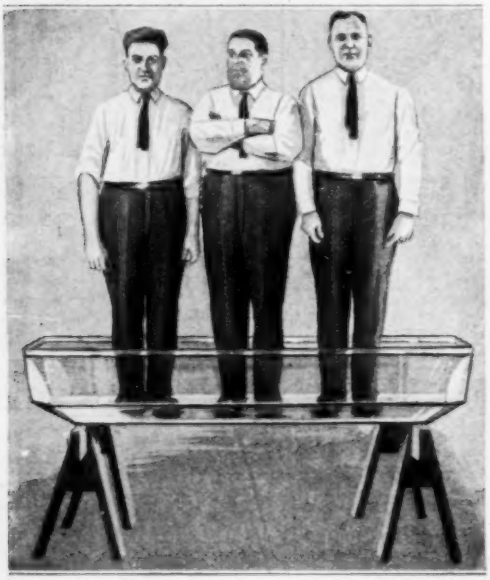
For Packing Ice-Cream Tubs with This Machine Only One Man is Required. There is No Heavy Labor and the Packing is Done Very Rapidly



Perfect Ice-Cream Bricks of from One to Three Flavors are Turned Out by This Machine without having been Touched by Human Hands. It Is More Sanitary and Rapid Than the Old Hand Method and Makes Layers of Equal Proportions

BURIAL CASKETS MADE OF CLEAR GLASS

Several unusual features have been combined in the manufacture of clear-



Showing a Transparent-Glass Casket That is Made Strong Enough to Hold the Combined Weight of Three Ordinary Men When Supported Only at the Extreme Ends

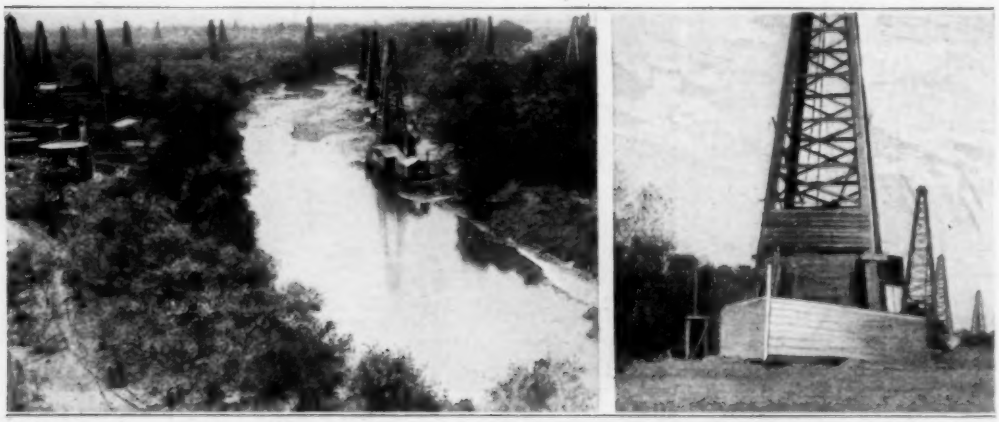
glass caskets, which is now an established industry. They are made strong enough to support three ordinary men standing upright in them, and the weight of both the bowl and cover of the casket is claimed to be only 260 lb. for a 6-ft.-3-in. model. Although additional weight is, of course, added in the way of trimmings, the glass casket has been found to be lighter than most of the metallic makes on the market. Glass is practically imperishable, and when made as strong as these caskets and hermetically sealed, should be proof against any underground elements.

ENDLESS CHAIN OF POISON KILLS RATS IN EUROPE

Rats are being destroyed in Europe by a novel method which is said to be the only hope of finally exterminating these pests. A poisonous powder is mixed with plaster of Paris and lard, to form a paste. This is placed on the inside of rat holes and sticks to the animals' fur as they pass. When the rat licks its fur it dies. Because rats eat their dead, its carcass kills others, establishing an endless chain of destruction.

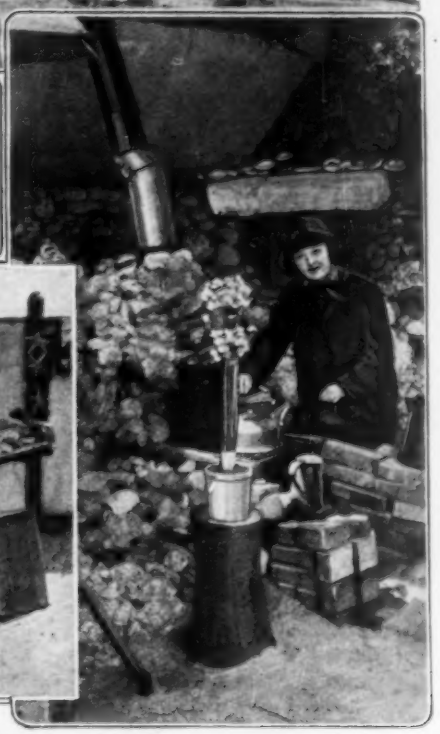
CONCRETE BASES FOR DERRICKS NEEDED IN TEXAS OIL FIELD

Nine-foot concrete bases, or piers, were built to hold the derricks while drilling certain oil wells in Texas recently. The wells were drilled in the bed of the Clear Fork, which is a tributary of the Brazos River. Most of the time, the bed is almost dry, but occasionally heavy rains make it a raging torrent of water. To withstand these flood waters, the concrete piers were built, and have successfully resisted them, although a bridge located a short distance upstream was completely washed away. Special permits had to be obtained from the state in order to drill the wells in a waterway, and the state receives a royalty on the production.



At the Left is Seen the River Bed as It Looks from an Airplane and with Considerable Water in It, and at the Right, When Practically Dry; Here the Concrete Bases of the Derricks are Seen

HERMIT SELLS SEA LIFE TO MOVIE FIRMS



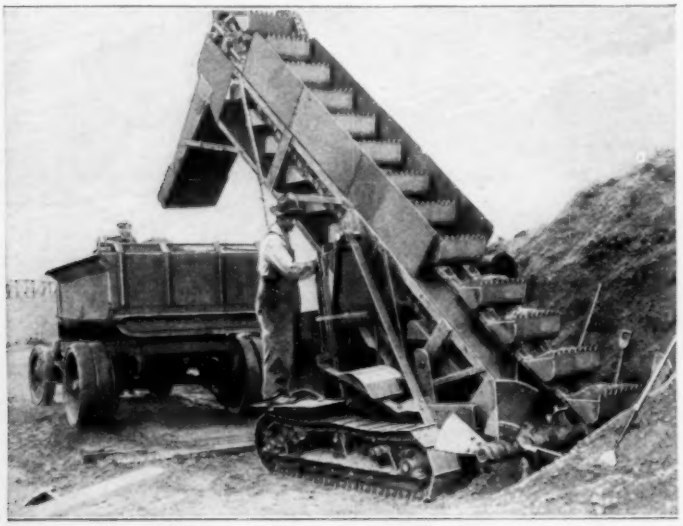
Three Views of the Hollowed-Out Sand Dune Which Is the Home of a California Hermit: The Exterior, Above, is Covered by a Desert Vine to Hold the Sand in Place. The Fireplace, at the Right, is Built of Shells and Coral. Below: Tables Holding Some of the Sea Specimens Which He Sells to Make His Living, and a Prospective Customer Examining Them

Living in a hollowed-out sand dune over which he has induced a desert vine to grow in order to keep his home from whirling away in a windstorm, a hermit residing near Santa Monica, Calif., ekes out an interesting existence in selling sea animals and plants to moving-picture producers. The stove within his humble dwelling is built of coral and sea shells which he has procured from the receding tides on the ocean beach. He has a stock of live inkfish, cuttlefish, and squids, as well as other sea monsters, which he keeps in glass tanks about the place. The motion-picture men have found it more profitable to buy their requirements of horseshoe crabs, starfish, seaweed, etc., from the recluse than to search the seas for them. Remuneration for his wares nets the hermit enough for clothing and food, as well as a little money on the side for his other small wants.

¶ The Popular Mechanics Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by addressing the Bureau.

WAGON LOADER WITH CREEPERS WORKS ON SOFT GROUND

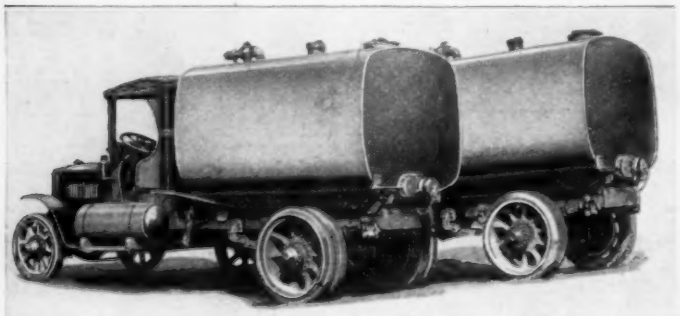
No more need wagons or trucks be "stuck" in the soft ground surrounding the gravel or coal pile, with the use of a loader recently put on the market by a New York manufacturer. The loader, which is of the bucket-elevator type, has a distinct advantage over others in its line, because of being equipped with creepers, which provide a wide bearing surface. They are 10 in. wide and 8 ft. long, thus dividing the total weight of the machine so that the ground load is only 7 lb. per square inch. Propellers at the bottom of the conveyor force the material in toward the bucket elevator, which is driven by a 37-hp. tractor-type engine. This engine also drives the whole machine at a forward speed of 75 in. per minute, a reverse of 45 in. per minute, or a crowding, or loading speed, of 22 in. per minute, thus handling material very quickly.



Here the Creepers are Seen, and Also the Propellers Which Push the Material into the Path of the Conveyor That Loads the Truck

POWDERED PEAT AS FUEL FOR HEATING FURNACES

Peat soils exist more or less in all parts of this country, but to the greatest extent in Minnesota. In this state there are approximately 7,000,000 acres of peat. It is therefore gratifying to learn that a stage has now been reached where plants are being erected for burning pulverized peat for heating purposes in large buildings.



After It has been Pulverized, the Peat is Delivered to the Heating Plants in These Air-Tight Containers Mounted on the Motor Trucks. The Discharge Nipples Are at the Bottom of the Containers behind the Rear Wheels

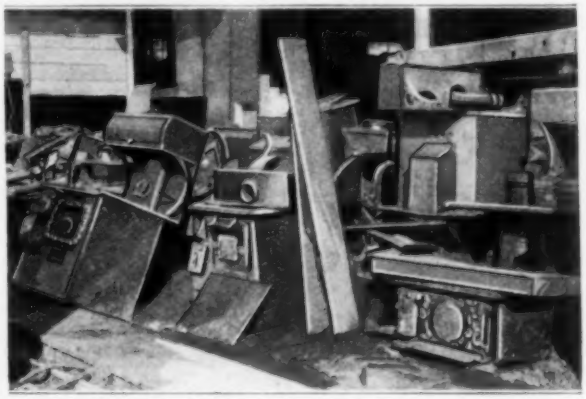
The first operation is to pulverize the peat, after it has been thoroughly dried, to the consistency of fine flour, in a special plant, from which it is delivered to the heating plant in large air-tight containers carried on motor trucks. At the heating plant this powdered peat is dumped into a hopper at the road level, from which it runs to a second hopper, below, at the level of the furnaces. From this it passes through a screw conveyor into a fan blower, which drives it by means of suitable piping to the burners in the furnaces. The blower is under control so that the quantity of peat, and its force of delivery at the burners, can be regulated. In connection with the feed piping, a second system of piping is connected to a suction fan. The purpose of this is to suck back all the unburned peat, of which there always will be a certain amount, and to return it to the delivery hopper.

The first installation of this type was in a university registering about 500 students. Another plant, now in course of erection, will heat a large office building.

PROSPEROUS STOVE BUSINESS FROM SALVAGE

By CHARLES A. GODDARD

EVERY day there is dumped onto a lot in a section of Los Angeles one or more ranges or stoves that offer but little promise except to the junk man. To the casual observer the rusty, bent, and broken old ranges are hopeless derelicts. To one Californian, however, they have been the means of building up a business that began with less than a shoestring, but which today sells over 4,000 ranges a year, besides gas and water heaters, oil stoves, water tanks, lawn mowers, and many large hotel and restaurant ranges. By rebuilding what others relegated to the junk pile, this man has reached this volume of business within five years.



Junk to All Appearances, but Each of These Old Ranges will Either be Rebuilt into a Serviceable Piece of Merchandise or will Furnish Parts to Help Put Others into Salable Condition

The business began in 1916, when, after having failed in the hardware business in the East, he started to repair lawn mowers, stoves, and ranges. As he gradually accumulated some of these, it was necessary to find a market for them, and the idea of selling rebuilt goods in these lines came to him. Prices of the new goods were high then, and the articles sometimes hard to get. Developing the business to the point where he could afford to employ expert welders, sheet-metal and other workers, he began to gather up the derelicts from various sources. A great number came from large downtown stores which followed the common policy of accepting old ranges or stoves as part payment for new ones. As the business increased, many came to the plant through the trading-in plan.

These Rows of Rebuilt Ranges Present a Striking Contrast to the Dilapidated Ones Shown in the First Picture

Section of the Plant Where Water Tanks and Heaters are Salvaged: Parts of Stoves and Ranges Which Are Still Good are Saved to Replace Worn-Out Parts in Others

A representative of the establishment visits the home where one is offered, and after examining it, proposes a price. If accepted, the range is picked up, with many others, in a truck, and on arrival examined by the experts of the plant. If the body of the range or stove is in good shape, it is scheduled for rebuilding. A new grate in a heater, an oven in a range, or some other repair, in many cases will put the article in condition to give years of satisfactory service. A "prescription" is prepared for it. The first operation is a chemical bath, given by lowering the stove or range by means of a crane into a metal vat. This removes

rust and the greases accumulated in its years of use.

After that, the experts remove the worn parts and install new ones. When it leaves the rebuilders it is, save for appearance, a new article. This defect the finishers remedy, for they are prepared to finish its nickel and steel parts in a way to compare with the new. It may be that a range will come into the plant that is almost a total wreck; although to the plant there is no total loss. If putting it into satisfactory shape would mean practically building a new range or stove, the course of economy is followed: It is stripped of such parts as are in satisfactory condition. These are then cleaned, labeled, and sorted into the proper tills of a series of large 2-by-2-ft. pigeonholes, numbering 375 in total. The plant carries parts for every known American range or stove. Thus stripped of serviceable parts, the worn range or stove is set out to go to the junk pile for what slight revenue it will bring.

One part of these junked ranges that finds ready service is the top and burners. With the body of the range hopeless for service, the top still can be made into a demanded article—the gas plate. These range from single burners for light housekeeping to long plates, such as restaurants use, burners from many old ranges going to make the latter.

Where the owner of an old range may place its valuation at a very low figure because of its looks and some slight handicap, the same range, refinished and repaired to produce satisfactory service, brings a good price.

Lawn mowers are handled in the same way, and a stroll through the department assigned to them is an exposition of the various makes that are for sale in this country. Hot-water tanks are corded as stove wood. Each old one is opened and the extent of the wear learned. If not too far gone, it gets a new bottom, or so, and is put up for sale. Tank heaters are also sold in large numbers, after being rebuilt and fitted to new or repaired tanks.

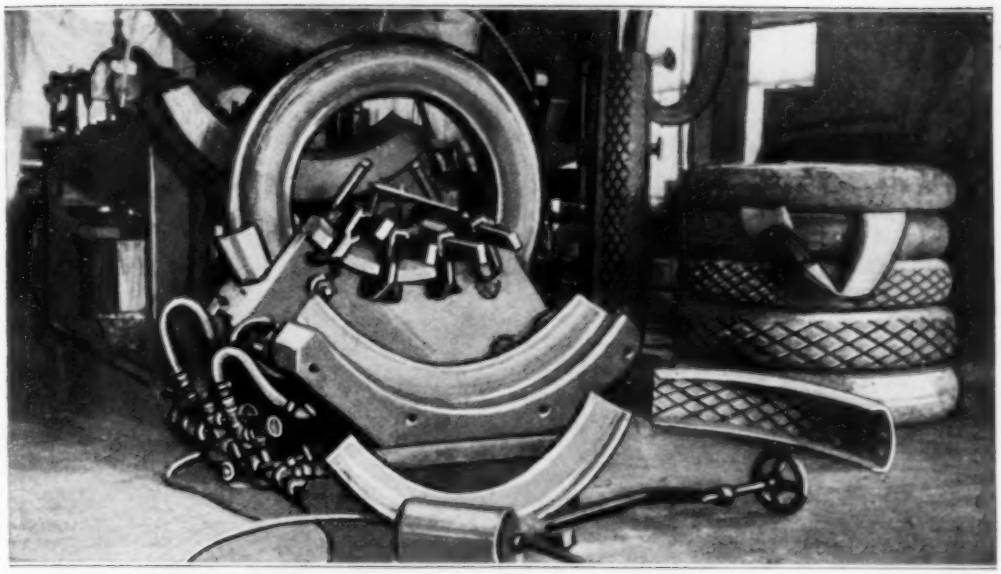
FLOORED SCOW DOES DUTY AS MOTOR-CAR FERRY

When the owner of an automobile wished to take his machine to Westport, N. B., recently, he was forced to improvise a special ferryboat. Westport is on an island about a mile from the mainland. There are no machines on the island, and the only means of reaching it is by a motorboat ferry. A scow was obtained, floored over, and the machine run onto it. The regular ferry then towed it across. The machine was run off the scow onto the shore on planking, and for the first time a motor car appeared on the island.

OX OF GIGANTIC PROPORTIONS EXHIBITED IN AUSTRALIA

An ox of gigantic proportions was exhibited last April at the Royal Sydney Show, in Australia. It was a seven-year-old, and stood 6 ft. 4 in. high. It had a girth of 14 ft. behind the shoulders, and weighed 3,700 lb. It came from New Zealand, and had arrived some days before the opening of the show. It was well proportioned in the forequarters, but its hindquarters were not nearly so robust. The Royal Sydney is one of the greatest agricultural shows in the world.

At the Left: Poling the Scow Automobile Ferry to Shore after Crossing to the Island. Right: The Scow, with Its Load, was Towed across the Harbor by the Small Launch Which is Used as a Passenger Ferry



Adjustable Mold, with Interchangeable Tread Plates in the Base, That Makes Repairs on Any Size or Shape of Pneumatic Tire: Bolts Hold the Three Main Parts of the Mold Together, and are Used to Adjust It to Any Required Width. The Tire is Compressed in the Mold by Pressure on the Sandbag Plate

ADJUSTABLE MOLD SIMPLIFIES PNEUMATIC-TIRE REPAIRS

In pneumatic tires for automobiles, and especially in those for trucks, there is considerable variation in dimensions, even in cases where, made by different manufacturers, they are nominally of the same size. Therefore, in repair work on these tires, to make correct vulcanizing possible, a newly patented adjustable tire mold that will take care of tires of any shape or size, should be very helpful. It will do retread vulcanizing of any kind by means of tread plates which are interchangeable in the base of the mold. The latter is made in three parts used to adjust, by bolts, the mold sides to any width desired.

FEW REAL "SLACKERS" OF MANY LISTED AS DRAFT EVADERS

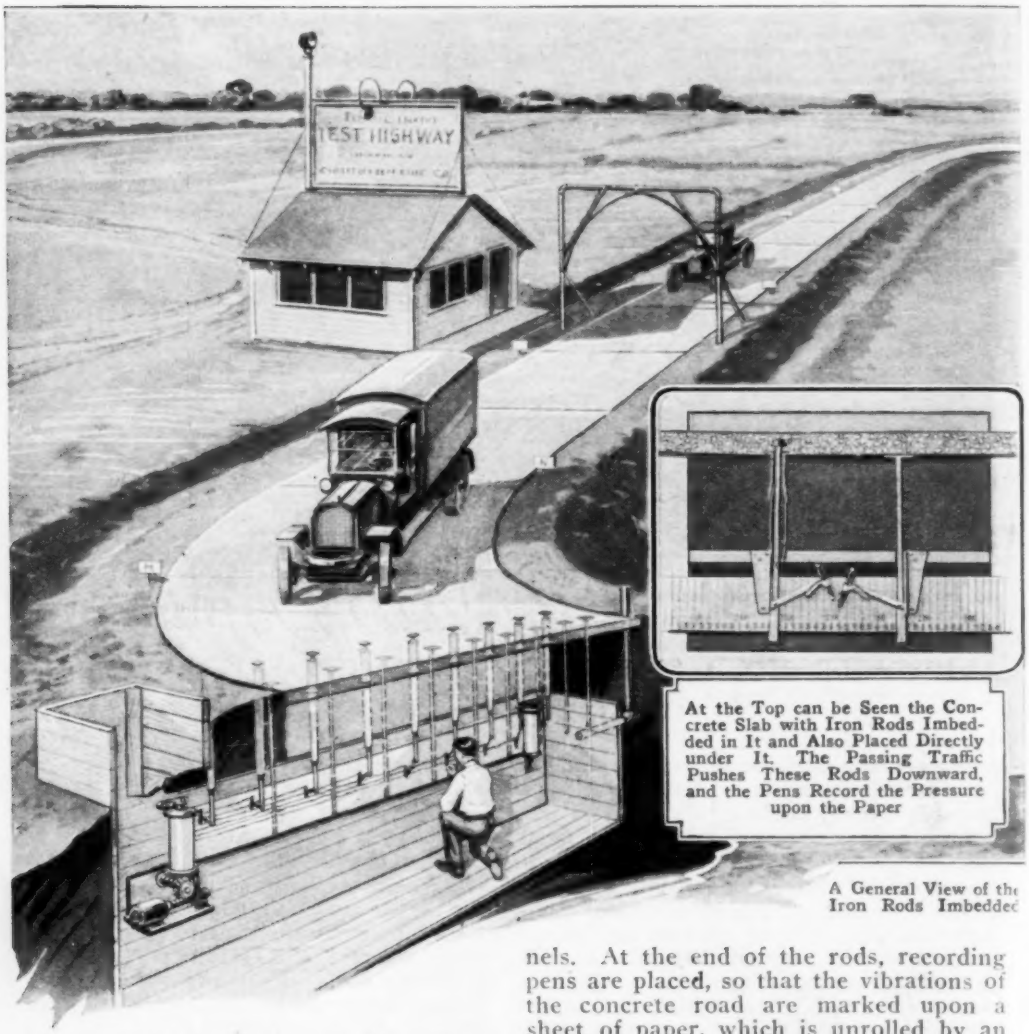
Out of a list of nearly 10,000 names, submitted by the War Department to the United States district attorney in New York City, of persons supposed to be draft evaders, 3,000 cases have been investigated and only nine have proved to be cases of actual draft evasion. The lists included all persons registered for the draft who failed to send in their questionnaires. Many of those listed have not been found, and many others had served in the army or navy. Some even lost their lives in the service.

OLD DUTCH WINDMILL MODEL FOR LOS ANGELES STORE

Advertising by means of unusual and picturesque architecture for store and shop buildings has become quite popular in many places. One example of this, the branch store of a Los Angeles bakery, which was built this fall, is a copy of an old Dutch windmill, a trade-mark of the firm. The store is a complete duplication, from the great clumsy wind vanes to the unevenly laid shingles which cover the domelike roof. Light and dark shades of Dutch blue, used in painting the building, add to the picturesque effect. The interior is equipped with the necessary counters and showcases, to make a complete little retail store.

Store in Los Angeles That Attracts Attention for Advertising Purposes by Its Unusual Architecture: It Is a Reproduction of an Old Dutch Windmill

ELABORATE HIGHWAY TESTS MADE



At the Top can be Seen the Concrete Slab with Iron Rods Imbedded in It and Also Placed Directly under It. The Passing Traffic Pushes These Rods Downward, and the Pens Record the Pressure upon the Paper

A General View of the Iron Rods Imbedded

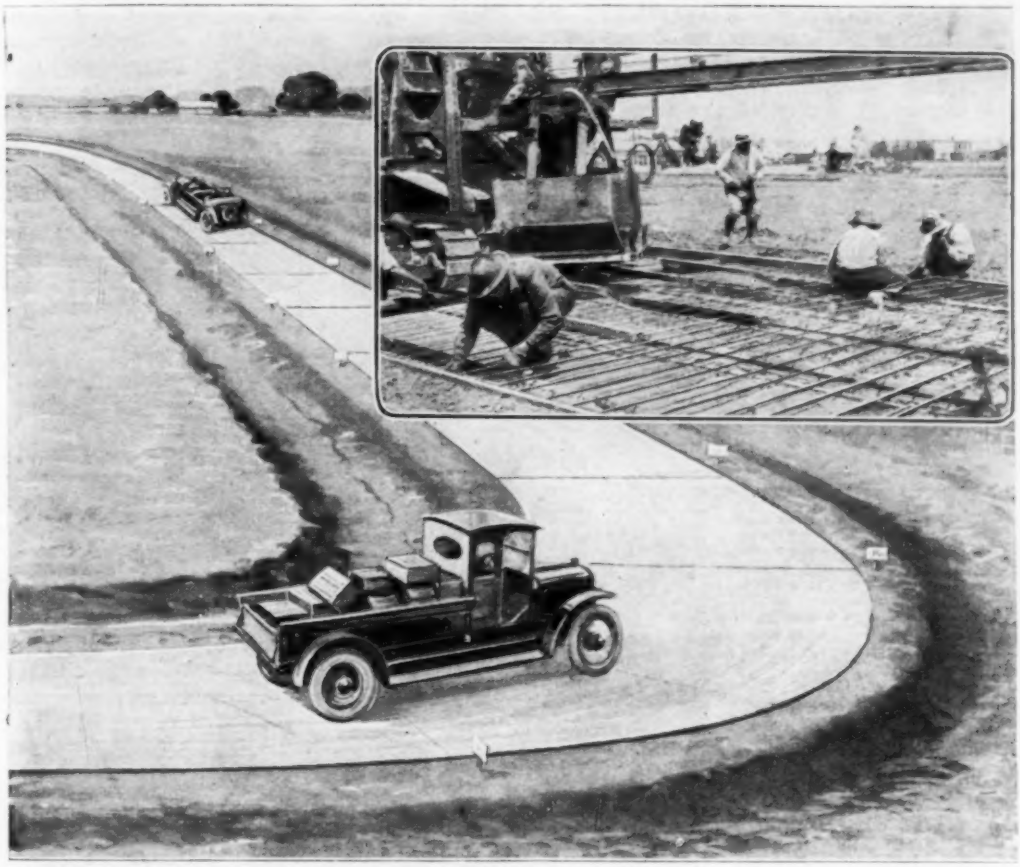
A test highway has been built at Pittsburg, Calif., upon which a series of tests will be made to determine the good and bad features of 13 different types of concrete pavement. The types selected represent results obtained from a questionnaire which was sent to many highway engineers, asking for their views on road building, and also what features should be included in the tests.

The road is 18 ft. wide, approximately one quarter of a mile long, and is built in an oval form, much resembling a race track. Four tunnels have been dug under the roadbed, and special instruments will be used to make graphic records of the effects of the various kinds of traffic passing overhead. For these instruments, rods are imbedded in the concrete, and extend down into the tunnels. At the end of the rods, recording pens are placed, so that the vibrations of the concrete road are marked upon a sheet of paper, which is unrolled by an electric motor. A special grade of reinforcing steel is being tried, and the road will be used for heavy traffic until it is completely destroyed, to prove which section is the best.

The surface of the pavement has been marked off in 6-ft. sections which are numbered and lettered. A close watch will be kept, and as soon as a crack appears in any section of the road, it will be recorded upon a chart. When the test is completed, the chart will show the location of each crack and the date of its appearance. It is thought that this is the first time any highway tests have been made from under the surface of the road.

The state of Illinois has also constructed an experimental highway about 12 miles southwest of Springfield, which is divided into seven different sections, or

WITH TUNNELS BENEATH ROADWAY



Test Highway Showing the Various Kinds of Loads being Driven over It: The Cross Section Illustrates the in, and Placed under, the Road to Measure the Varying Pressure. At the Upper Right is Shown the Placing of the Reinforcing

types, of concrete and brick-paving material. The traffic tests of the road will be accomplished by means of a battery of 10 motor trucks driven by trained operators. The loading of the trucks will be increased after each 1,000 trips over the 2½-mile highway. The maximum wheel load will not exceed 12,000 lb., which is half again as much as the legal load in Illinois. There are no curves in the road, and the grades vary from zero to .4 per cent, with an average grade of .1 per cent.

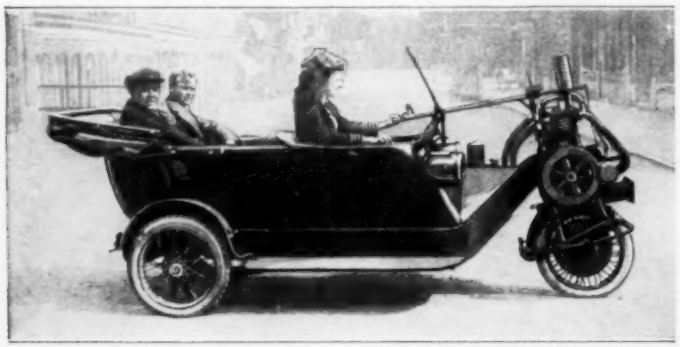
ENERGY REQUIRED IN SEWING BY HAND AND WITH MACHINES

That there is a great difference in the expenditure of energy required with different ways of sewing, was demonstrated recently by scientists. Little variation was found in hand hemming on fine handkerchiefs, cotton sheets, 8-oz. cotton duck, or army blankets, but when the speed of sewing was increased, the expenditure of energy increased in proportion. Hemming sheets on a foot-driven machine, which was discovered to be about six times as fast as doing the same work by hand, required six times as much energy, but the energy, per yard of sewing, was hardly one-half as great. When an electrically driven machine was used, the energy required per hour was not quite twice that used for hand sewing, and about one-fourth of that used for the foot-driven machine. The energy per yard of sewing was approximately one-fifth of that on the foot-driven machine, and less than one-tenth of that used in sewing by hand.

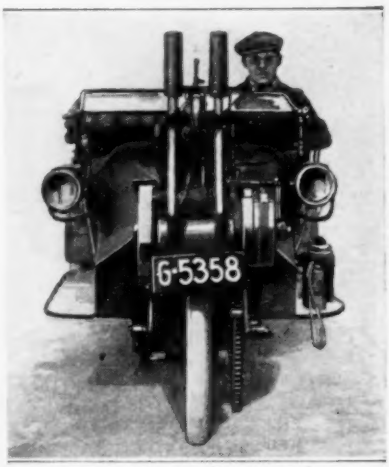
¶ Phosgene, the most deadly poison gas used in the World War, can be turned into a delicate-scented violet perfume, by means of a synthetic process which has recently been discovered by American chemists.

NEW EUROPEAN AUTOMOBILES PRESENT NOVEL FEATURES

Motor cars of a peculiar type, having their motors geared to the front instead of the rear wheels, have recently made their appearance in Europe. One, of Dutch manufacture, and one French machine, are the most conspicuous examples. The Dutch car is a light three-wheeler with a single-cylinder vertical motor directly over the single front wheel. The frame of the chassis is formed into a V-shape in front and curved upward as a mounting for the motor and front wheel. Steering is accomplished by means of a long steering handle connected to the front wheel.



PHOTOS COPYRIGHT, KEYSTONE VIEW CO.

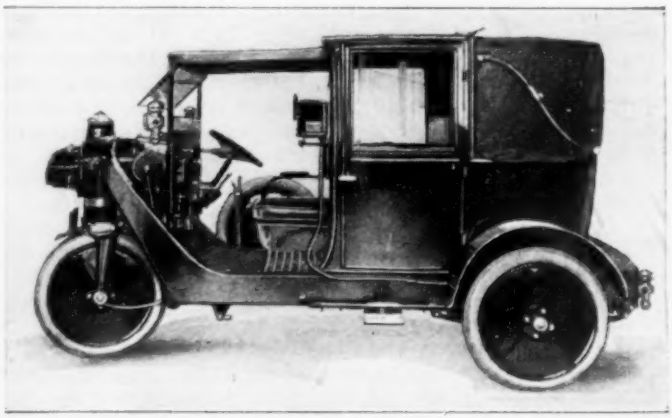


Two Views of the Three-Wheeled Dutch Automobile Showing, Above, How the Front Wheel and Engine are Mounted, and the Long Steering Lever: From the Front, Below, This Machine Looks Much like a Large Motorcycle

The French machine is said to be very economical in operation and is being used as a taxi, with rates as low as those of the horse cabs. Its frame is similar to that of the Dutch car and is attached to a fork at the front. From the side it appears to be a three-wheeled car also, but in reality has four wheels. The two front wheels are both mounted between the fork and only a few inches apart. This car is equipped with an ordinary steering wheel, and is supplied with various bodies for commercial and pleasure purposes. It is said to make a most economical light delivery truck. A two-cylinder motor is mounted just back of the front fork. All moving parts are so inclosed that a hood is unnecessary. A spiral spring around the upper part of the steering pivot is used in front, while the rear springs are of the ordinary leaf type. A conspicuous feature of this car is that either the engine or gear box may be quickly and easily removed and replaced by extra parts.

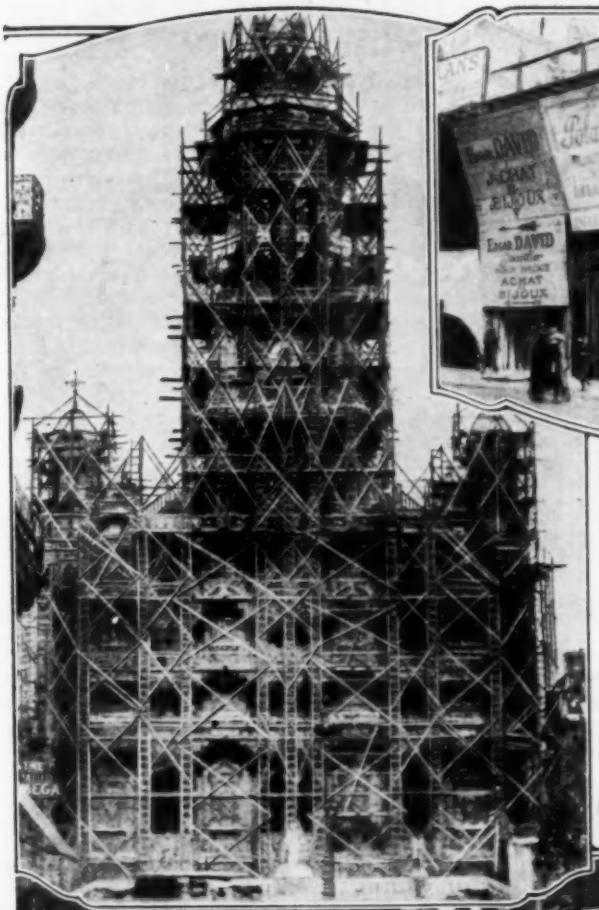
Three-wheeled motor cars were used in Sweden in 1914, but because of a tendency to tip over in turning curves, their operation was restricted in many cities.

¶It has been found that the disagreeable flavor that is imparted to eggs by cold storage, can be prevented by immersing them in a preserving fluid. This coats the eggshells so as to make them air-tight, and thus prevents the penetration of any particles of air which in the storage room becomes tainted.

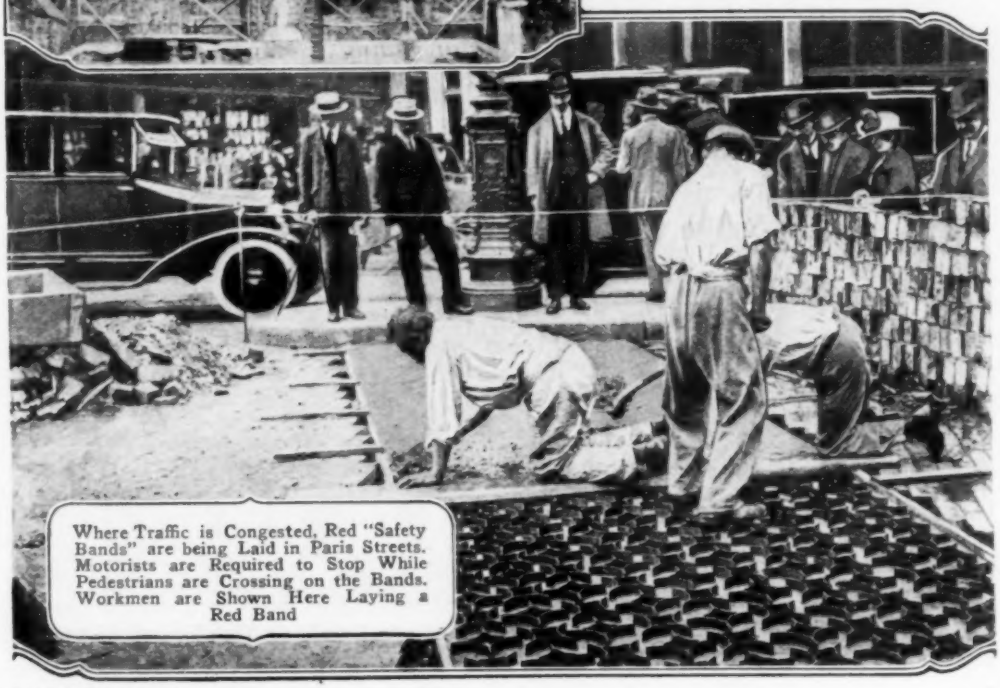


The French Machine, Equipped as a Taxicab: It Is a Four-Wheeled Car, Though from the Side It Appears to Have Only Three Wheels. The Two Front Wheels are Set Just a Few Inches Apart between the Front Fork

PARIS HUSTLING TO IMPROVE ITS APPEARANCE



"La Crise des Logements," as the Housing Shortage is Called in France, is being Met by Building Construction Which is Going On at a Furious Rate throughout All Sections of Paris. One of the Many Jewelry Stores of the Fashionable Rue de la Paix is Shown Above. Over It a Large Apartment Hotel is being Built. At the Left Is the Unusual Scaffolding Put Up for the Purpose of Repairing the Historic Church of the Trinity, Which has been Seriously Threatened Because of the Deterioration of Its Stonework. An Entire Structure, Covered with an Intricate and Symmetrical Scaffolding Such as This, Presents a Novel Sight. This Church, in Renaissance Style, Is among the Newer of Paris' Houses of Worship, being Built in the Period between 1860 and 1870



Where Traffic is Congested, Red "Safety Bands" are being Laid in Paris Streets. Motorists are Required to Stop While Pedestrians are Crossing on the Bands. Workmen are Shown Here Laying a Red Band

PHOTOS BY GILLIAMS SERVICE

COLLECTION OF SEAWEED AIDED BY TIDES

Along the south shore of Long Island, twigs anchored by means of short posts

The Barriers are Built to Trap Seaweed at the Ebb of the Tide. The Weed is Then Raked into Stacks at the Farther End of Each Barrier

are used as barriers to trap seaweed between the flow and the ebb of the tide. These barriers are placed at frequent intervals, forming stalls into which the seaweed is washed at high tide. The ebbing tide, receding, drops the mass of entangled seaweed, which is then drawn out on a stack beyond the reach of the water at high tide. Large quantities of the weeds are used as fertilizer, or burned to ashes from which iodine and other chemicals are made.

SURVEYING PARTIES NOW USE AEROPLANES AND AIRSHIPS

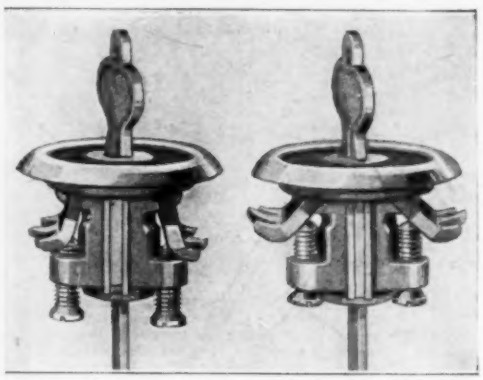
To gain, in five weeks, more information than the best-equipped land exploration parties could get in a year, is the goal of an Australian engineer who is using an aeroplane in his work. His task is to lay out a rough aerial survey of the best routes for the proposed railway from the north to the south of the continent. Following his trip will come an airship carrying a larger party of civil engineers, who will verify the first rough survey and make a more elaborate layout of the topography of the land. It is expected that a year's time can be saved by using this preparatory aeroplane method, and that eventually all extensive surveys will be preceded by preliminary air-craft work, thus also effecting a considerable saving in money.

RAW-RUBBER SOLES NOW USED ON ENGLISH SPORT SHOES

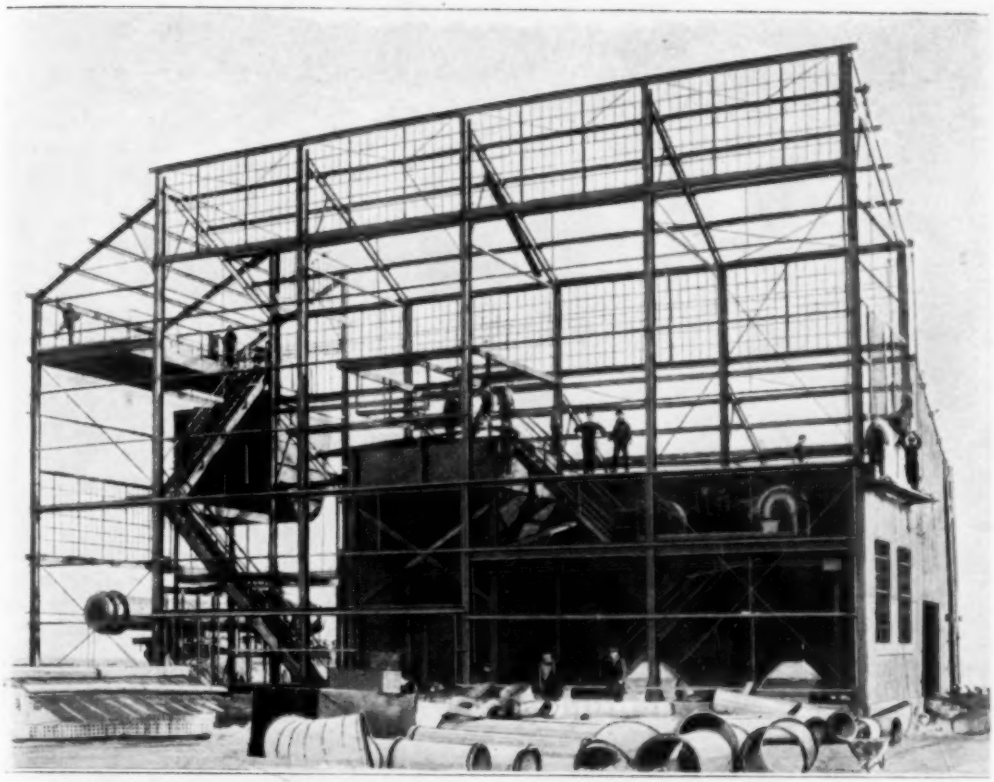
English shoe manufacturers are preparing to make sport shoes with raw-rubber soles, since it was discovered by tennis players on Far Eastern rubber plantations, that the crêpe, or raw-rubber soles, lasted longer than those of the vulcanized variety, and were much more pliable. Rubber soles are commonly seen on different kinds of footwear, but these have undergone the vulcanizing process, which means the introduction of a certain portion of sulphur to make the rubber less liable to be affected by atmospheric changes. It is thought that the new soles can be made to sell as cheap as the vulcanized article, even though they are of pure rubber.

CYLINDER FOR DOOR LOCKS VERY EASY TO INSTALL

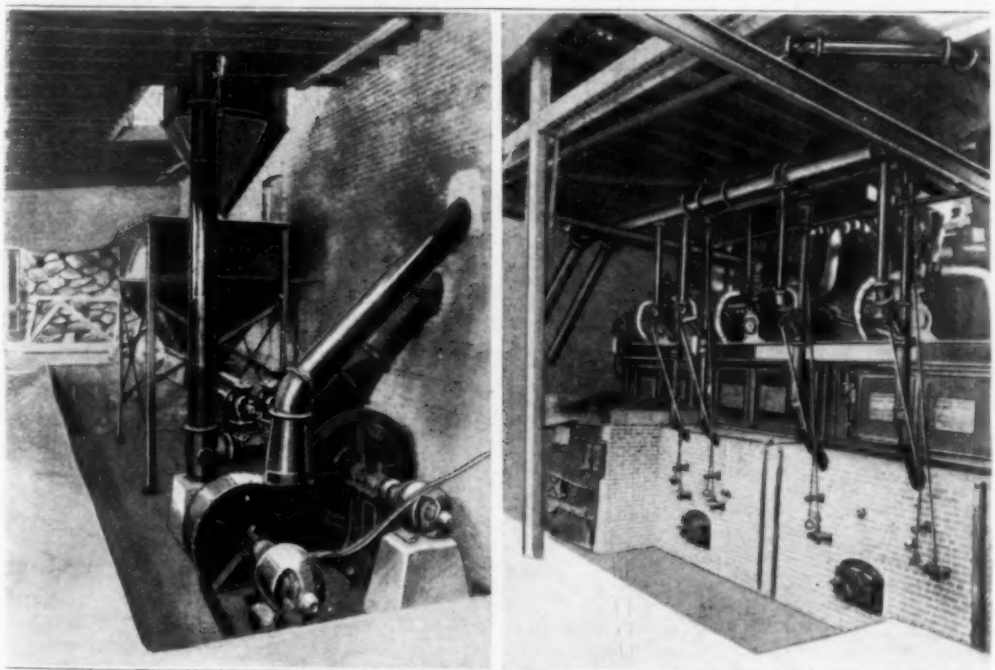
For door locks, an expansion cylinder that fits and adjusts itself to any thickness of door, can be installed more easily and quickly than the old-style cylinder. The cylinder has two hinged claws that move outwardly and are gripped by two setscrews, which are permanently engaged to the cylinder. It is installed by inserting it into the door hole and tightening the setscrews with a screwdriver.



Cylinder for Door Locks That Fits and Adjusts Itself to Any Thickness of Door. Left: Before Insertion. Right: After Insertion with Setscrews Tightened



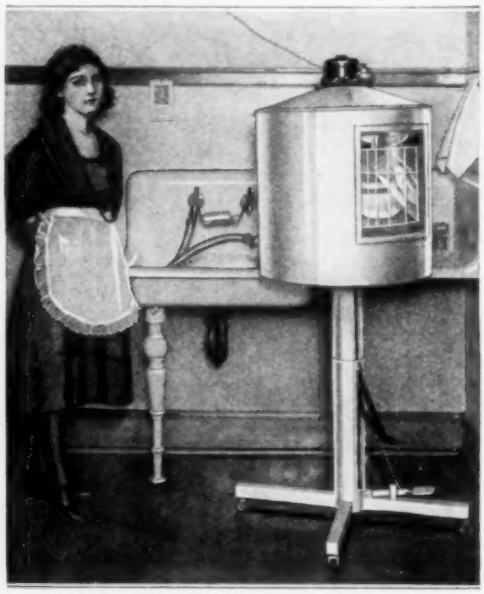
Peat-Drying and Pulverizing Plant in Course of Erection: In This Plant, When Completed, the Peat will be First Thoroughly Dried and Then Pulverized Until It is Reduced to the Consistency of Fine Flour. It Is Then Ready for Delivery to the Heating Plant in Any Building Suitably Equipped for Burning It



Left: In the Background Are Two Hoppers for Delivering Powdered Peat to a Blower, the Rear One of the Two Fans in the Foreground, Which Delivers the Peat to Burners in the Furnaces Shown at the Right. The Other Blower is for Forcing Additional Air to the Burners to Increase Combustion When Required

DISHWASHING IS PLEASURE WITH PORTABLE MACHINE

No more frowns or sighs will accompany the task of washing the dishes,



The Portable Dishwasher in Operation, Showing the Dishes Inside and the Connection to the Water Faucet: The Pedal for Raising or Lowering, and the Casters, are Seen at the Bottom

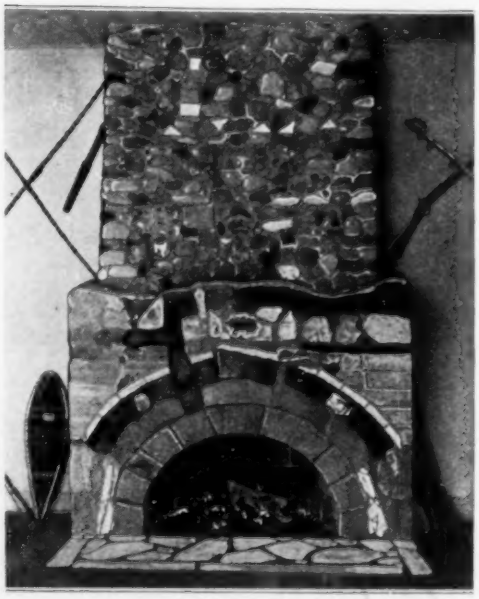
if a new portable dishwasher is used. The machine can be raised or lowered by a pedal, and is mounted on casters, so that it can be loaded at the table and then wheeled to the sink, where the water is run in. Five minutes of washing cleans the dishes, after which the dirty water is drained and hot water run in again, which rinses the dishes and cleans the washer at the same time. A small electric motor is used to circulate the water.

ALASKAN NATIONAL FORESTS HAVE HUGE TIMBER WEALTH

The most heavily timbered section of Alaska is the western slope of the Pacific coast and the numerous islands of the archipelagos that line this coast. In this section there are two National Forests, the Tongass, which embraces what was formerly known as the Alexander Archipelago, and the Chugach, which comprises the islands of the Prince William Sound. In both cases there is included a narrow strip, at most two miles wide, of the adjacent Pacific coast. The area of the government land in these reservations is 20,579,740 acres. It has been estimated that the Tongass National Forest contains 70,000,000,000 ft., board measure, of merchantable timber, which means there is sufficient to yield annually and perpetually wood pulp amounting to 2,000,000 tons. The enormous size of some of this timber may be judged from the fact that, in one instance, 1,500 logs scaled 1,500,000 ft., or about 1,000 ft. to the log. Western hemlock predominates, being 60 per cent of the total. The Chugach Reserve is similar to the Tongass, but is much smaller.

BOY SCOUTS STUDY GEOLOGY FROM NEW FIREPLACE

At the Evanston, Ill., headquarters of the Boy Scouts, a fireplace has been constructed for the study of geology and physiography. At the base are shown the different kinds of materials, in their relative positions, that make up the strata of the earth. At the top, many different specimens of ore are shown. Models of a lake bed, and of a river bed, are also built into the fireplace, which is ornamental as



A Geological Fireplace with Many Specimens of Ore Imbedded in the Top, and the Different Kinds of Materials Which Make Up the Strata of the Earth, Built into the Base

well as useful, and it is asserted that the fireplace is the only one of its kind in the country.

¶ Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

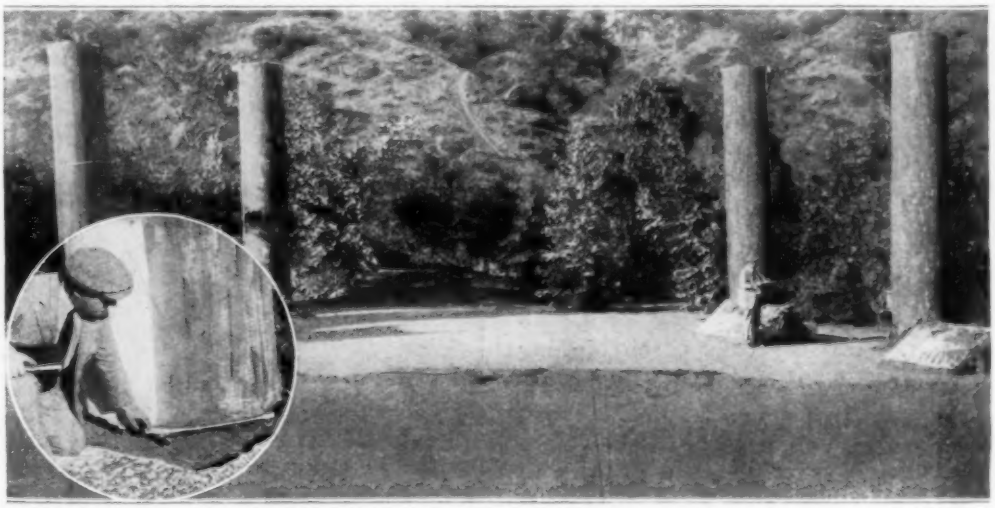
Reversible Scenery Arranged to Give an Indoor Effect on an Outdoor-Theater Stage: The Four Marble Settees and Massive Columns Produce a Portico Setting. By Stretching Canvas between These Columns, a Realistic Interior Scene of Any Kind can be Produced. Draperies, Rugs, Furniture, and Ornaments may be Added

REVERSIBLE SCENERY FOR OUTDOOR THEATER

By JOHN ANSON FORD

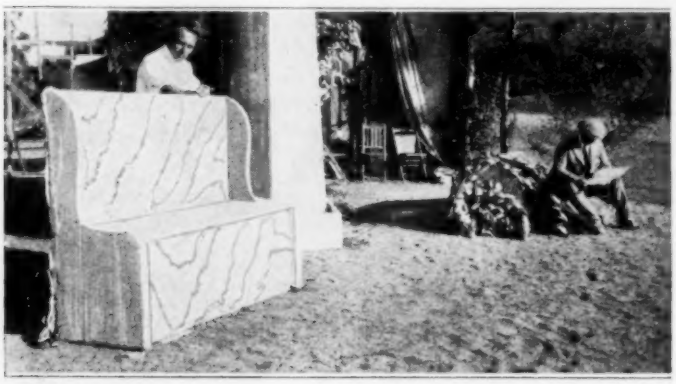
THE problem of providing a change of stage scenery for an outdoor theater, which did not have so much as a curtain, not to mention other stage accessories, was solved recently by producers of two Shakespearean plays in the Hollywood Bowl, a beautiful and popular community-gathering place in a suburb of Los Angeles. The need of these two plays was for one outdoor and one indoor scene. This need was ingeniously met by building a set of stage furniture and properties, each unit of which was reversible. Thus, between acts while the lights were turned off and the stage was in semi-darkness, each unit in this novel setting was turned around, or turned upside down, according to the character of the piece. The result was a complete change of scene. The idea, which the designers worked out themselves, never having seen it applied elsewhere, is applicable to other stages where the scenery facilities are limited.

The indoor aspect of the set consisted chiefly of four massive, smooth columns with square bases, and four imitation marble settees with high backs. These,



Outdoor Effects are Produced by Turning the Marble Settees Upside Down to Represent Moss-Covered Rocks, and by Giving the Columns a Half Turn to Make Them Represent Tree Trunks. Inset: Base of One of the Columns, Showing Its Support, and Casters under It to Facilitate Turning

together with other pieces of movable furniture, draperies, rugs, etc., were used very successfully in creating a portico scene, and by stretching of canvas between the pillars, a palace interior could be represented.



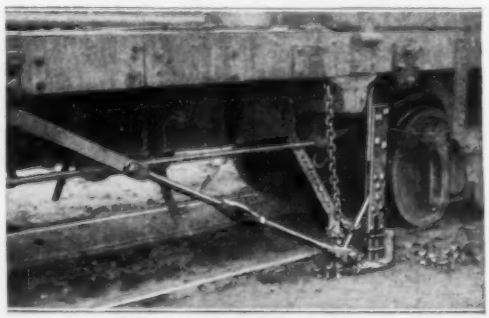
In the Foreground Is a Close-Up of One of the Reversible Marble Settees. In the Background Is One That has been Turned Upside Down, and in That Position Represents a Moss and Leaf-Covered Rock

When the play demanded an outdoor setting, it was not necessary to remove all these cumbersome articles. Instead, the pillars were turned around on their bases, each being mounted on casters, and forthwith the pillars were transformed into the trunks of huge trees. While this turning was done, branches were thrown about the bases, concealing the casters and adding to the general woodland effect. Likewise, the four settees were turned over, face forward, and became irregular, moss-covered rocks. To make the height of the settees appear less, each one was provided with a triangular addition that was placed next to the end, thus adding to the angularity of the rock. When the settees were set upright, these supplementary pieces were concealed immediately back of them, so that putting the pieces properly in place in the woodland scene was only a moment's task. Shrubbery and small trees growing at the back and sides of this outdoor stage helped materially in creating a very realistic scene, and while the tops of the trees were lacking above the massive trunks, the lighting was such at night that this was scarcely noticeable.

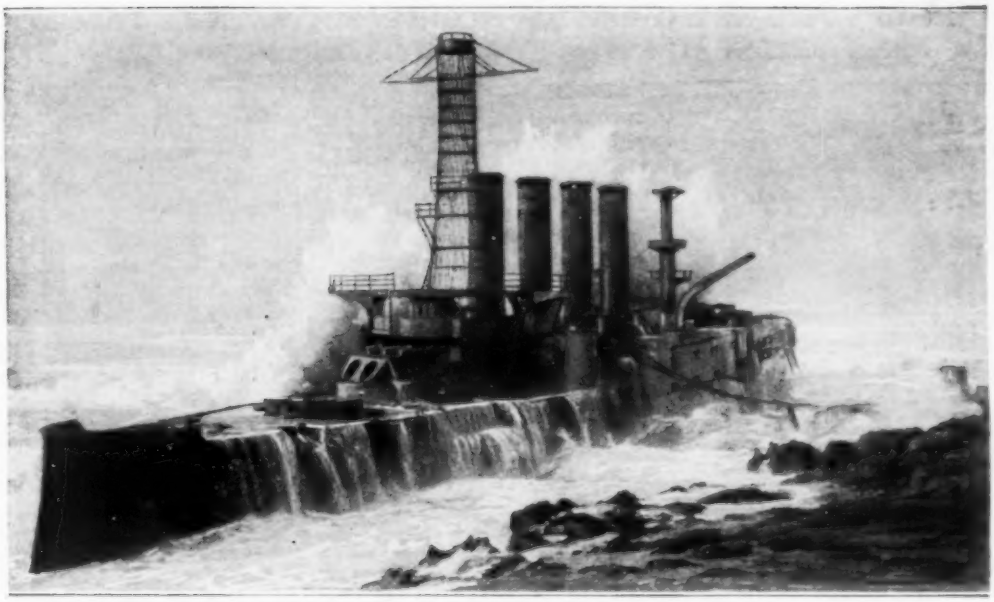
The construction of the settees was the easier of the two tasks, as it was only necessary to cover the back side with stage moss and canvas, properly painted to represent stone. In making the pillars, the work was less simple. Since the outdoor theater had only a natural floor of earth and sod, it was necessary to set a wooden platform about 3 ft. square, in the earth for each of the pillars. This base was made strong enough to carry some ballast within, and heavy iron casters were screwed to the bottom so that, when placed on the wooden platform, it could be turned on its axis easily. A removable rectangular base piece, or more correctly speaking, a piece which appeared to be rectangular but in reality had only three sides, was set about the base of each pillar when it was a part of the indoor scene. When the pillar was used as a tree trunk, this base piece was removed, and boughs were scattered about it, as previously mentioned. It is expected that this scenery will prove useful in non-Shakespearean plays also.

ASPHALT PAVEMENT DUG UP WITH WORK-CAR TOOL

Instead of the old way of cutting asphalt pavement, in which hammers and chisels were used, street-railway companies have put in use a great labor saver in the shape of a cutting tool which can be attached to a work car. The tool projects downward from a shoe that rides on the pavement about 18 in. from the rail. This shoe is supported by a framework which is attached to the car at three points, and which can be swung up under the car when not in use. The cutting tool depends upon the weight of the car to force it into the pavement, and in cold weather it is necessary to weight the car before the tool will cut.



Work Car Fitted with Framework and Shoe through Which Pavement-Cutting Tool Projects

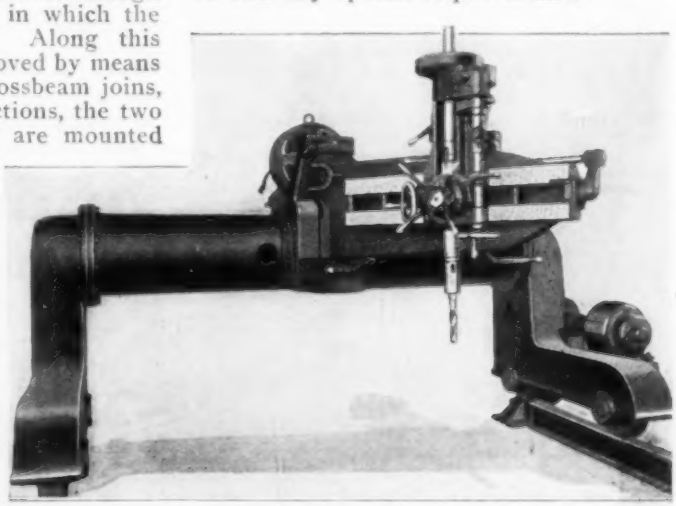


WRECK OF U. S. S. "MEMPHIS" LITTLE AFFECTED BY FIVE YEARS' STORMS

THIS remarkable photograph, showing the wreck of the former U. S. S. "Memphis" being battered by the equinoctial gales of September, 1921, is striking evidence of the quality of American shipbuilding. During a hurricane in August, 1916, the armored cruiser "Memphis" was driven onto the rocks of the outer harbor of Santo Domingo City, in the West Indies. For five years the vessel has withstood the terrific hammering of the waves which is so clearly shown here. The spray can be seen going completely over the tall funnels.

GANTRY DRILLING MACHINE FOR DRILLING PLATES

In the manufacture of tank cars there is now being used a novel form of gantry drilling machine which is mounted on a track, the gauge of which is wide enough to straddle the tank plates in which the machine is drilling holes. Along this track the machine can be moved by means of an electric motor. A crossbeam joins, by means of flanged connections, the two parts of the machine that are mounted on the track, and from a pivotal support on this crossbeam swings a radial arm upon which is mounted the drilling head. The drill is driven by a motor mounted behind the radial arm on the crossbeam. With direct current, an adjustable-speed motor can be used, and with alternating current a multispeed motor, permitting a wide range of speeds through the combination of electrically controlled changes with the mechanical changes of the drill head. Two, three, or four radial arms and heads can be connected to the same crossbeam—in the case of four, two being on either side of it. The span of the drill and the gauge and length of the track can be adapted to suit any special requirements.



Gantry Type of Drilling Machine Which Travels on Track with Gauge Wider Than the Plates That It Drills by Means of a Drill Head Supported on a Swinging Radial Arm Connected to the Crossbeam to Suit Any Special Requirements

100,000 VOLTS ARE CARRIED OVER BERLIN STREETS

Lofty steel towers carrying high-tension lines of 100,000 volts are to be seen along the streets of Berlin, Germany. The city recently decided to operate a municipal lighting plant, and thereby supply the city with illumination free.

BARGE SYSTEM PROVES SUCCESS FOR SHIPPING GROCERIES

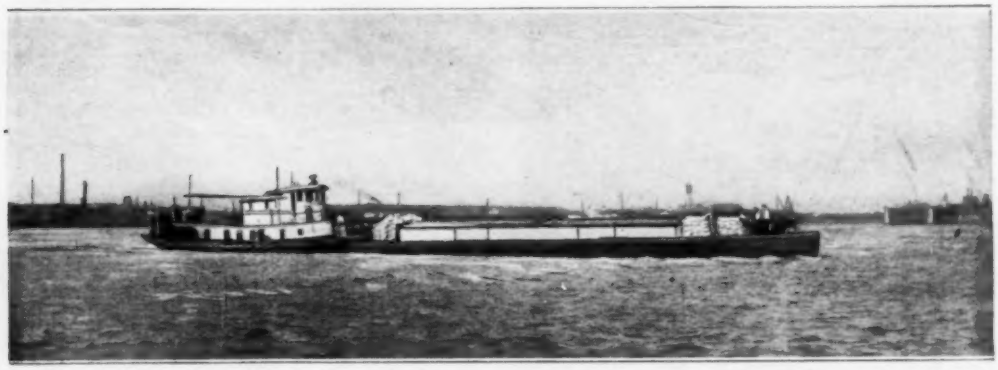
The commercial value of inland waterways is strikingly illustrated by the experience of a company in New Orleans. This concern operates 11 wholesale groceries in Louisiana and Mississippi. Several months ago a power boat was put into service to transport merchandise from New Orleans to the stores at Houma, Thibodaux, and Lockport, La. Soon after two barges were added, and recently a third, the "Interstate 3," made its first trip. This barge has a capacity of 150 tons, is 108 ft. long, 20 ft. wide, and draws only 4 ft. of water when loaded. The success of this method of transport is proved by its rapid expansion. Smaller power boats and barges are now being used to make deliveries from the various stores.

CONCRETE TRESTLES TO CROSS SOUTHERN RIVER SWAMPS

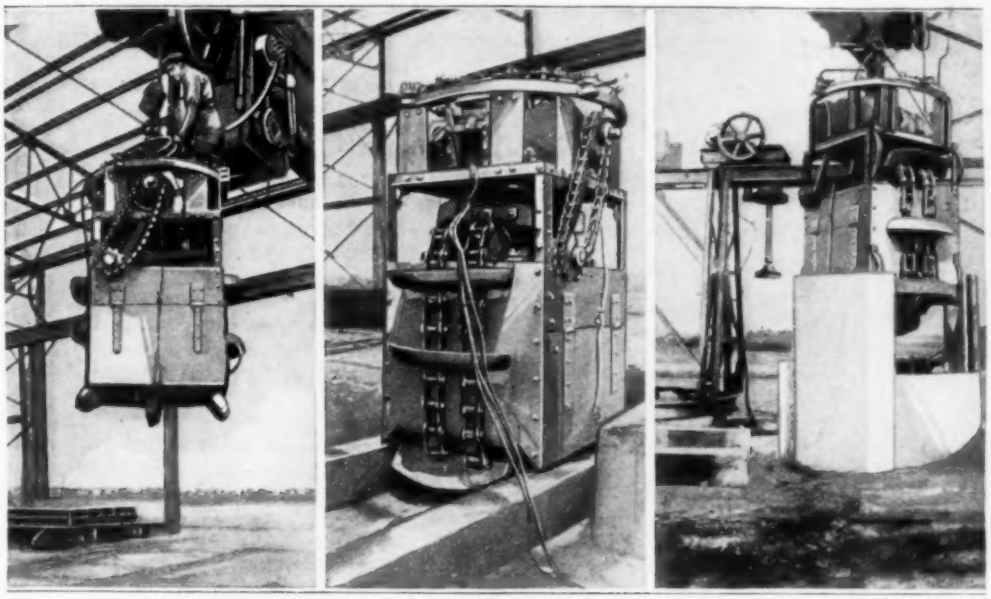
Not one of the three rivers of South Carolina, the Santee, the Pee Dee, and the Savannah, is crossed by a bridge within 170 miles of the ocean. They have, therefore, been more of an impediment than an assistance to development of the state. Plans have now been made for a bridge of similar design over each of these rivers. The largest one will be over the Santee River, at Murray's Ferry, about 65 miles from the ocean. This river, like the others, has a very narrow channel, the greater part of its width consisting of swamps, which, at the bridge site, are four miles wide at flood water. Over the main channel there will be steel-truss fixed spans and a draw span, but the main part of the bridge will consist of approach trestles, 6,000 ft. long, built of reinforced concrete. The spans will be of two types, the pedestal type with 36½-ft. concrete beams and bents on timber piles, the other having 24½-ft. concrete beams on concrete pile bents. Construction work is now under way. The bridge over the Savannah River will be located a little below **Augusta,** and a fourth bridge will cross the Wateree River at Garner's Ferry. All four bridges will cost about 2,200,000 dollars.

SHAFT-DIGGING MACHINE AND CAISSON SINKER

In the sinking of caissons for building foundations, as done at present by hand, men have to work continuously at the bottom of the shaft, with always an element of danger from cave-ins. There has now been developed a machine that digs the shaft and sinks the caisson more rapidly with one operator only, and with-



The "Interstate 3," a New Barge Which Is the Most Recent Addition to a Fleet Employed by a New Orleans Wholesale-Grocery Concern to Supply Its Branch Stores Located on Water Routes



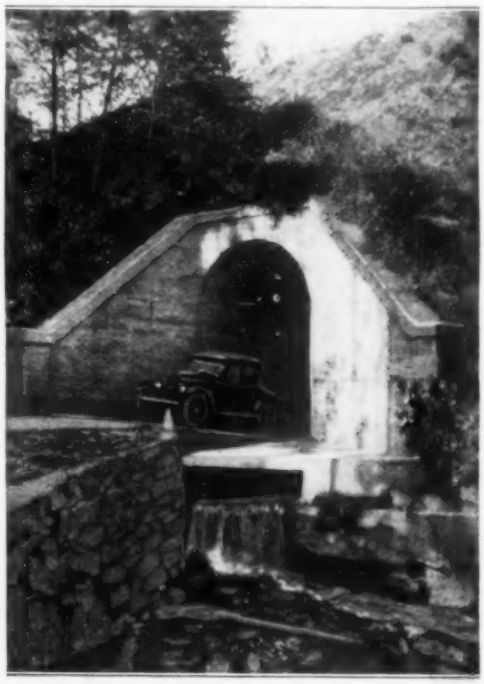
From Left to Right: Shaft-Digging Machine Shown Slung from a Crane with the Operator in Place; a Closer View of the Machine, Showing the Digging Buckets on the Endless Chain, and the Side Door for Emptying the Hoisting Bucket; Caisson Shown around the Digger with the Jack That Sinks It

out any possibility of a cave-in. Moreover, no pumping is required, which in hand-digging is always necessary.

The digger consists of a quadrangular hoisting bucket, around which runs an endless chain carrying a series of digging buckets. This is driven by an electric motor and speed-reduction outfit, which are mounted in a rigid framework above the hoisting bucket. The digger is slung from a derrick or crane, and after being filled, is hoisted and instantly emptied by raising a door on each side of the bucket. This and all other operations are under control of the bucket man, who rides on top of the machine. As the digging proceeds, the caisson is sunk into the shaft by a jack, operated above ground, that can be moved along a swinging cantilever beam to any point on top of the caisson.

MOUNTAIN STREAM AND ROAD SHARE TUNNEL

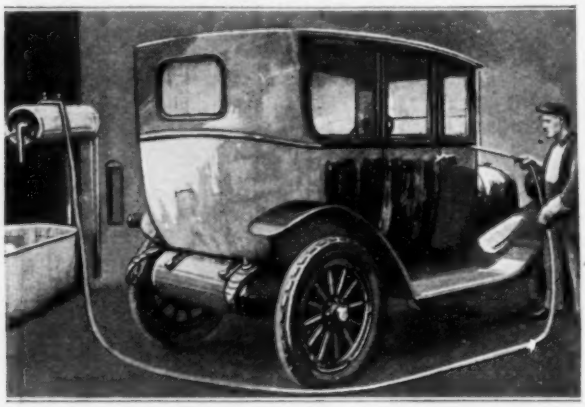
A tunnel that answers the double purpose of accommodating highway traffic, and forming a bed for a mountain stream, can be seen near Asheville, N. C. The tunnel was originally built by railroad engineers, to carry the stream away from the tracks, but the state highway commission laid a false concrete floor in it, thus dividing it into two parts. In dry weather, the water is easily carried in the small runway, but in the event of heavy rains or spring floods, the stream would no doubt occupy the highway also, regardless of the protests of delayed motorists.



At the Top can be Seen the Railroad Right of Way; in the Center, the Automobile Demonstrates the Roadway, and at the Bottom, the Stream as It Is in Dry Weather

MACHINE REMOVES PAINT QUICKLY AND CHEAPLY

Removing paint from automobile bodies is easily and quickly accomplished with a new machine. The device consists of a tank and heater, attached to the city water main. The water is heated to a temperature of about 200° and mixed with a chemical compound in the tank. By means of a hose attached to the tank, this mixture is thrown onto the surface of the machine and completely removes the old paint. About one hour is required to clean the entire body and chassis of an automobile. This cleaner can be adapted to use in railroad shops, to prepare coaches for repainting, and is said to be economical, not only of time but also of labor and materials. Hence it should be a welcome addition to shops doing such work.



The Machine in Use Removing Paint from the Body of an Automobile: Besides Being Economical, Its Use Makes an Easy Task of One That Is Hard When Ordinary Methods are Used

WIRELESS CONCERT HEARD BY MOVIE AUDIENCE

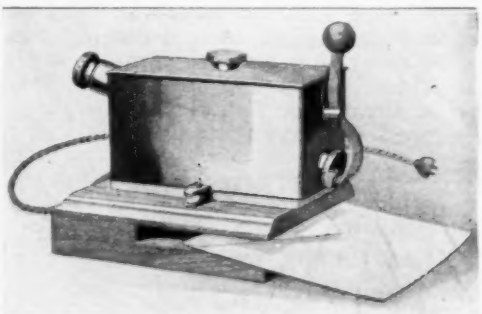
A wireless concert was heard by the delighted patrons of a motion-picture theater at Cedar Rapids, Ia., recently through the courtesy of the University of Wisconsin wireless station, which makes a practice of sending out all important musical entertainments given at Madison. Before each entertainment, the surrounding stations are notified regarding the time of the concert, and the wave lengths that will be used in sending it. Thus, those who wish can "listen in," and in the case of theaters, large amplifiers, or loud-speaking receivers, are used to magnify the sounds so that the audience can hear plainly anywhere in the auditorium.

FORT WAYNE, INDIANA, FAMILIES BUILD THEIR OWN HOMES

Fourteen families in Fort Wayne, Ind., with the aid of a real-estate company, have beaten the house shortage by building their own homes, doing the actual work themselves. They spent the whole summer on the job, some even camping on the ground so the whole family could work whenever possible, and they are now living in their houses. The company purchased materials, with marked instructions, from a concern selling ready-cut houses. Each prospective house owner agreed to do the labor of building in place of a first payment, and when the house was completed, to pay the cost at the rate of one per cent a month. The work was supervised by carpenters employed by the company. Many occupations were represented in the colony, which included a blacksmith, plumber, electrician, painter, railroad shopman, machinist, conductor, carpenter, mason, printer, and a salesman.

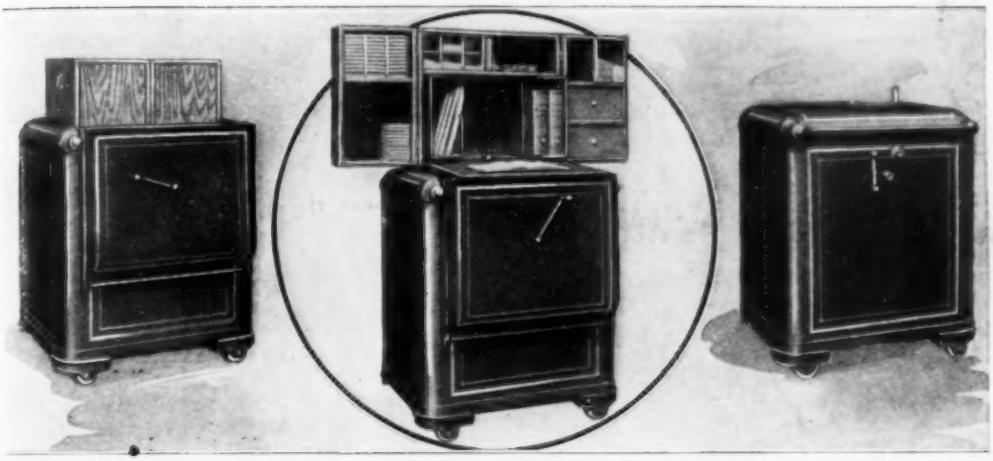
ELECTRIC DEVICE FOR MELTING AND APPLYING SEALING WAX

An electric device for melting and applying sealing wax, exhibited in Paris, France, is a small box set on a slotted base. The wax is inserted through an opening at one end and melts when the current is switched on. When a spring lever, at the opposite end, is pressed, it uncovers an opening from which the melted wax drops onto the flap of the envelope, inserted to the proper depth into the slot in the base.



COPYRIGHT, PADEL & HERBER

The Opening, with a Screw Cap, for Inserting Wax Is at the Left End. The Slot Allows the Envelope to be Placed below the Other Opening



The Safe-Desk is Shown at the Right as It Appears When Closed and Locked. At the Left It has been Unlocked, the Top Swung Back, and the Desk Partly Raised by the Lever Seen on the Front of the Safe. In the Center the Desk is Completely Raised and Opened to Show the Arrangement of the Compartments

COLLAPSIBLE DESK FITS IN SAFE

A compact, complete, and fireproof bookkeeping system is a most welcome addition to garage equipment. The desk folds up, and is lowered into the safe by a lever attached to the front. The lever is then removed and the top of the safe is swung into place. A secret cabinet is located in the bottom of the safe, where valuables may be deposited. The safe is as nearly burglar-proof as is possible, being of regular safe construction and made of steel 4 in. thick. The desk comes completely stocked with standard sales books for garages.

LUMINOUS STAR MAP AIDS AMATEUR ASTRONOMERS

The fascinating study of the stars is the oldest of the sciences, and one which has interested human beings for ages. The average person, who has not the time to take up this extensive study, but whom the stars interest as he gazes up at them on a clear night, is usually bewildered if he tries to distinguish one from the other. As an aid to the amateur astronomer, a star map has been drawn which shows the stars of the first five magnitudes, and the different constellation groupings. The stars of the first four magnitudes, and the lines showing the constellation groupings, are marked with radium salt, thus making them shine at night. The map is 4 ft. long, 1 ft. wide, is hinged for convenient folding, and is mounted on cloth or linen, which makes it easy to handle or carry.

STATUE OF FAMOUS HORSE CAST IN BRONZE

It is not often that a horse is honored by a statue, but this tribute was paid to "Justin Morgan," the progenitor of the Morgan horses which have been famous in farm-animal history for the last century. A bronze statue of the animal was presented to the U. S. Department of Agriculture's Morgan horse farm, at Middlebury, Vt., by the Morgan Horse Club, on the centenary of its death. The figure, by a prominent animal sculptor, cost $18,000 and stands on a granite pedestal on the lawn of the farm.

This Statue of "Justin Morgan," the First of the Famous Morgan-Breed Farm Horses, Represents the Standard of the Breed

STEEL SMOKESTACKS WRECKED BY 46-MILE WIND

Eleven immense steel smokestacks, measuring from 4 to 8 ft. in diameter and from 80 to 135 ft. in height, were completely wrecked in a 46-mile-an-hour wind, during a recent storm in Pittsburgh, Pa. The stacks, which were part of a large steel plant, fell upon the roofs of the buildings. Fortunately no one was injured. Damage estimated at over $100,000 was done to the stacks and buildings.

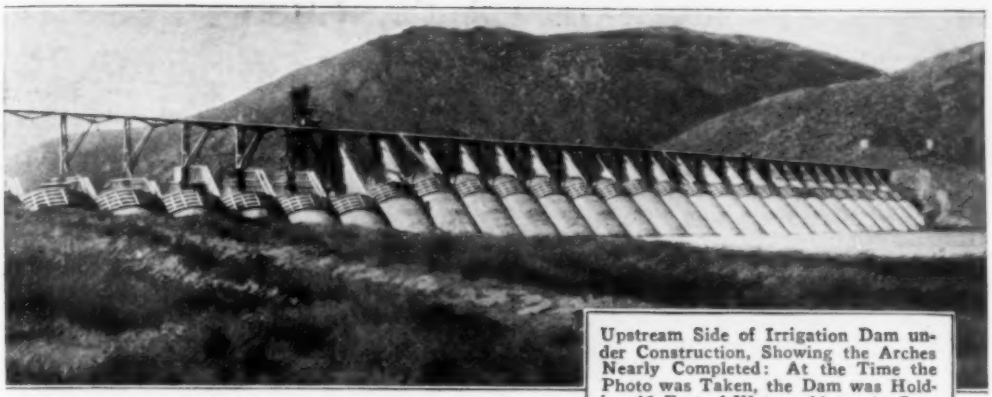
Showing the Havoc Wrought to 11 Steel Smokestacks at Pittsburgh by a High Wind: In the Foreground are Seen the Prostrate Stacks, Some of Which Smashed against and Wrecked Near-By Buildings

NEW SUBMARINE POWER PLANT WILL GIVE 10,000-MILE RADIUS

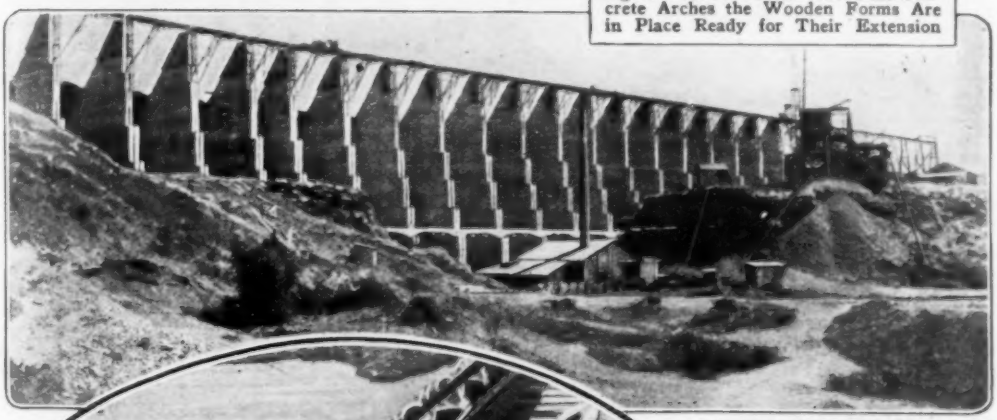
Submarines of the newest design will have a cruising radius of 10,000 miles, owing to the installation of a new type of power plant, thus enabling them to operate for a month away from their bases or tenders. The plant, which is a combination of gas and electric propulsion, will combine the latest developments resulting from experiments conducted by naval engineers. Twelve engines with a total of 6,500 hp. can drive these 300-ft. boats, of 2,025 tons, at a surface speed of 24⅛ miles an hour, and a submerged speed of 11½ miles. When completed in 1923, each of the three boats now being built at the Portsmouth, N. H., Navy Yard, will be armed with a 5-in. gun which is designed to remain exposed to the water when the ship is submerged. This gun can be trained almost in a complete circle or elevated as an anti-aircraft weapon. Machine guns will be mounted on the conning-tower bridge, and storage space is planned for 16 torpedoes of 21-in. size. Forward will be four torpedo tubes, and aft, two others.

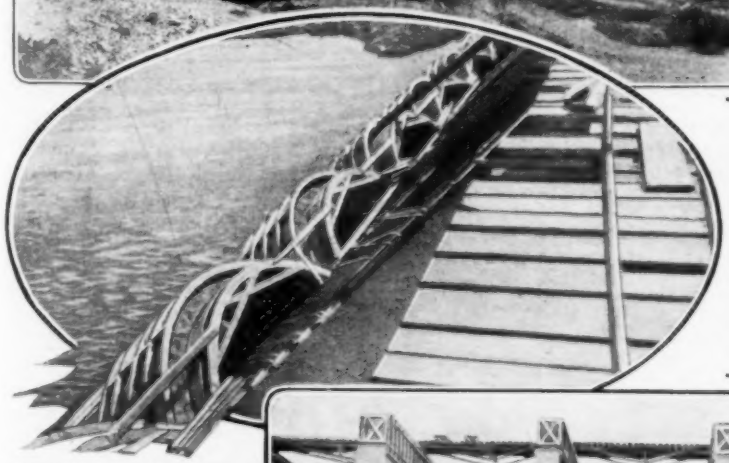
NEW IRRIGATION DAM OF MULTIPLE-ARCH TYPE

There is now under construction on Fish Creek, near Carey, Ida., a multiple-arch dam that will have a top length of 800 ft., when completed, and a height of 125 ft. The work has been stopped temporarily, but it is expected to be renewed this winter or early next spring. It will store water for the irrigation of several thousand acres of land. It consists of a series of reinforced-concrete triangular-shaped piers, spaced about 25 ft. apart. The upstream faces of these piers slope at an angle of 50° from the horizontal, and their downstream faces are nearly vertical. Between these piers, along the entire length of the upstream face, is a series of arches, forming, in effect, much the same kind of structure as the reinforced-concrete floors that are common in large office buildings.



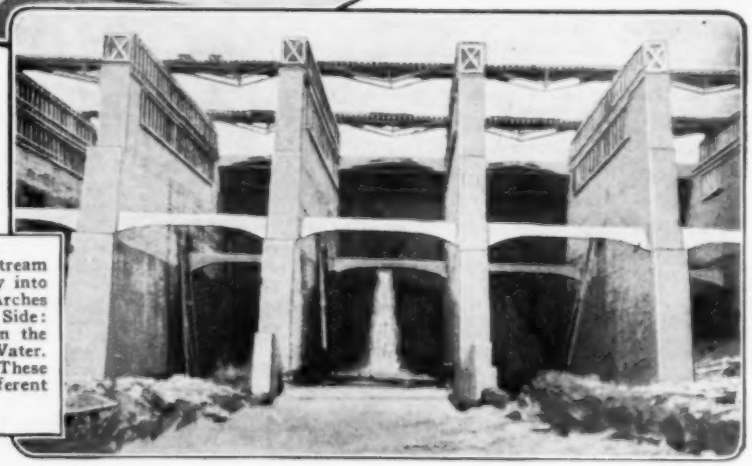
Upstream Side of Irrigation Dam under Construction, Showing the Arches Nearly Completed: At the Time the Photo was Taken, the Dam was Holding 45 Feet of Water. Above the Concrete Arches the Wooden Forms Are in Place Ready for Their Extension





Above, the Downstream Face of the Dam Showing the Rear of the Piers with Their Slight Slope from the Vertical: Here Are the Concrete-Mixing and the Erecting Plants. In the Foreground Is the Power House, with Engine and Boiler Equipment. These Piers Are 25 Feet Apart and Are Over 100 Feet High. The View Shows the Greater Part of the Dam, but Not All of It

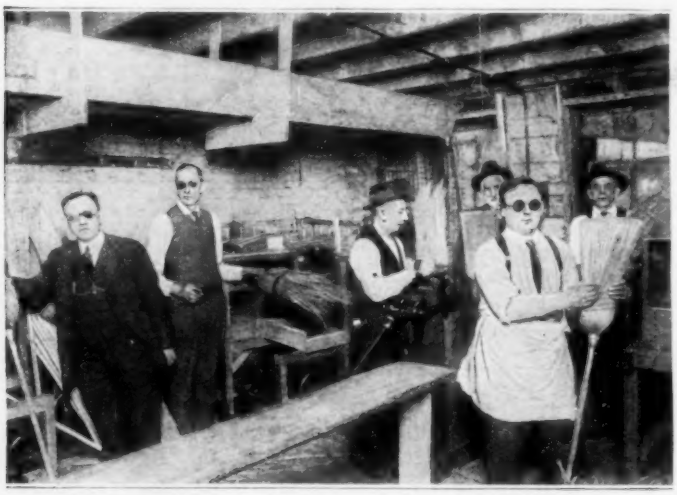
Close-Up Showing Very Distinctly the Construction of the Wooden Forms for Pouring the Concrete Arches. These are Removed after the Concrete is Poured



Looking from the Downstream Side of the Dam Directly into the Underside of the Arches That Form the Upstream Side: Here is Seen in Operation the Means of Passing the Water. There Are Several of These Discharge Valves at Different Elevations

SIGHTLESS UNION MEN RUN BROOM FACTORY

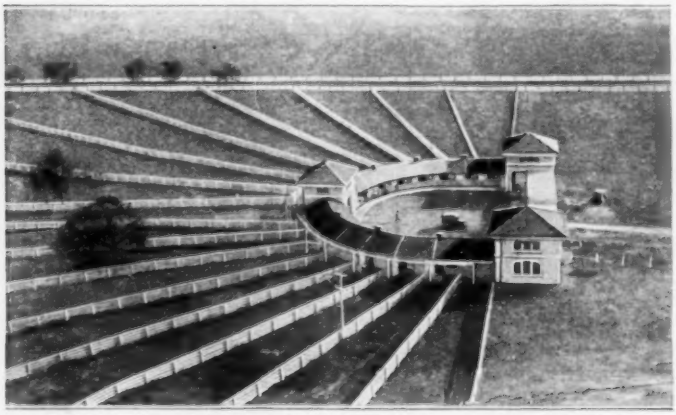
A small broom factory established some time ago in Washington, D. C., with the backing of the American Federation of Labor, is perhaps the first of its kind to be operated exclusively by blind workmen. These are all disabled members of labor unions of recognized standing, as of course it was for the benefit and protection of its own unfortunates that the federation sponsored the enterprise. The equipment was bought, too, with money subscribed by locals of the city. Though the making of brooms is at present the only activity, it is hoped that in time the factory will be enlarged for the manufacture of belts, mops, baskets, and chairs. Were it not for this enterprise, many of these men would be hard put to make their living.



The Broom Factory, a Corner of Which is Seen Here, was Established with the Backing of the American Federation of Labor for the Benefit of Blinded Union Men

HORSESHOE-SHAPED BARN BUILT ON MISSOURI FARM

On the Pickering farm, near the town of Belton, in western Missouri, there is a barn and corral which are laid out in a curious way. The farm is stocked with 1,000 head of cattle, and the barn and corral were built to care for the herd bulls. The barn is in the shape of a horseshoe. Fences radiate from it and inclose several acres of ground, dividing it into 17 separate runways.

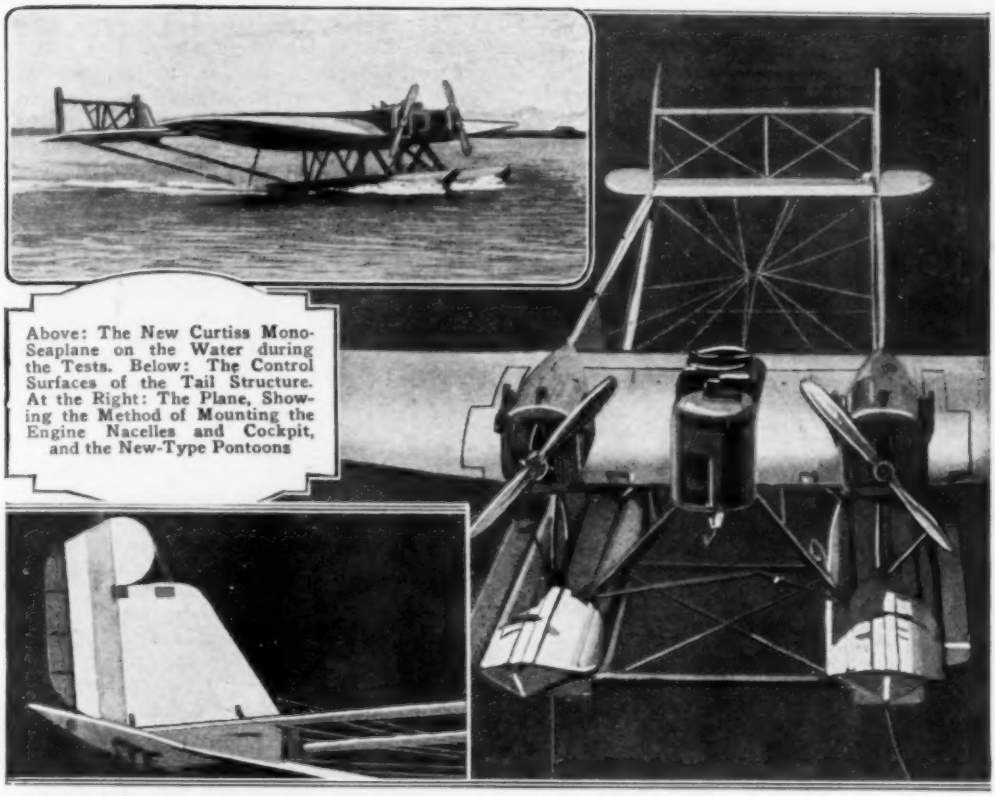


This Horseshoe-Shaped Barn, with Radiating Runways Forming the Herd-Bull Corral of a Big Farm in Western Missouri, Presents a Curious Sight

ENORMOUS DECREASE SHOWN IN 1921 COAL PRODUCTION

During the first six months of 1921, the world's coal production decreased enormously from the high mark attained in 1920. The total coal mined during that period is estimated by the United States Geological Survey at approximately 579,000,000 tons, or at the rate of about 1,158,000,000 tons a year. If maintained, this rate would produce, for the year 1921, 550,000,000 tons less than in 1920, and much less than in any of the preceding 10 years. The British miners' strike, lasting from April to June, and the industrial depression, affecting the manufacturing and shipping of the entire world, are considered chiefly responsible for this decrease.

¶ Write our Bureau of Information if you wish to know who makes or sells any article described in this magazine. Send no postage; the service is free.



Above: The New Curtiss Mono-Seaplane on the Water during the Tests. Below: The Control Surfaces of the Tail Structure. At the Right: The Plane, Showing the Method of Mounting the Engine Nacelles and Cockpit, and the New-Type Pontoons

MONO-SEAPLANE BEING TESTED AT ROCKAWAY AIR STATION

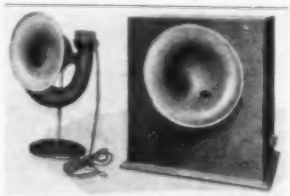
The new Curtiss mono-seaplane, except for the Loening plane which has recently demonstrated its success, represents the sole experiment with this type of machine in the United States. The Curtiss machine has been under test by the United States Navy, at the Rockaway, Long Island, air station, and the first photographs of it in flight have been obtained. The plane embodies principles of construction adapted from the JL and NC flying boats. It is equipped with two motor nacelles placed in the wing structure. Between these is the pilot's cockpit. When on the water the machine rests upon two pontoons of original design, placed directly below the engine nacelles.

DENTAL CLINICS IN SCHOOLS ARE INCREASING IN NUMBER

Replies to a questionnaire recently sent out by the U. S. Bureau of Education show that in 286 cities dental clinics have been established in connection with their public-school systems. In 181 of these cities the clinics are supported by the local boards of education; in 33 by the city health departments; in 22 by these bodies jointly, and in 50 by the Red Cross or private donations.

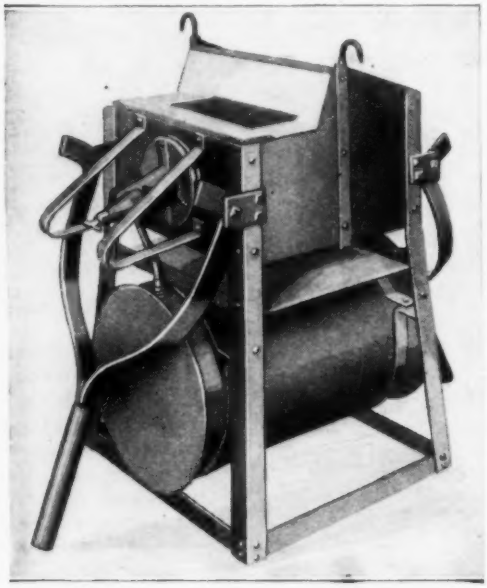
WIRELESS RECEIVER SHAPED LIKE HUMAN EAR

Using the human ear as a model, a remarkable wireless receiver has recently been designed. A small reproducer, similar to that of a phonograph, consisting of a permanent magnet, armature, and mica diaphragm, turns the electrical energy into sound. The sound chamber is made of a wood compound, and molded by hand in the shape of the human ear. The receiver is of the amplifying type; that is, the sound is made louder. It is claimed that a telegraph message can be received at a distance of 100 ft. with this instrument.



OIL-BURNING RIVET FORGE FOR PORTABLE USE

An oil-burning, portable rivet forge has been designed, that has folding handles, for carrying from job to job, and lifting

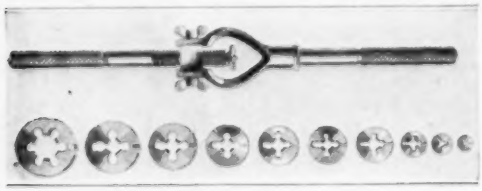


At the Top can be Seen the Rivet-Heating Chamber. The Carrying Handles Are on the Sides, and the Oil Tank is Seen at the Bottom

ears, for moving by crane. The burner is very simple to operate, as it uses low-grade fuel oils or kerosene, and will not clog nor sputter. Starting with a cold forge, it will produce rivets hot enough to drive within five minutes. No direct blast touches the rivets, which are handled from the top, and are always in plain view.

DIE STOCK TAKES ROUND DIES OF DIFFERENT DIAMETERS

A die stock that will take round dies of any outside diameter from $\frac{5}{8}$ to $2\frac{1}{4}$ in., inclusive, is now on the market. The loose handle of the stock is readily adjusted to line up with the side spot hole



Above is Shown the Stock with the Two Thumbscrews, and Also the 10 Round Dies Ranging in Size from $\frac{5}{8}$ Inch Up to $2\frac{1}{4}$ Inches

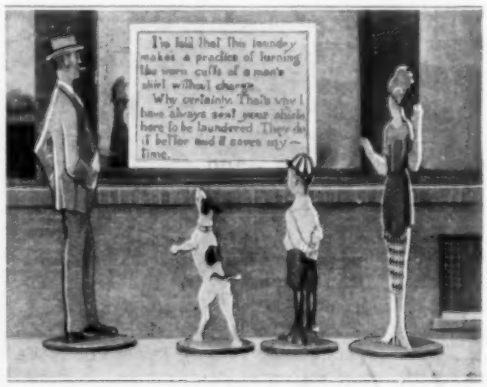
of the die by means of a sliding block which moves up or down in the jaw of the other handle, and is held in place by two thumbscrews. The pointed end of the loose handle that fits the spot hole is of hardened tool steel and resists wear. Thus the same stock can be used for as many as 10 different-sized dies, which is certainly an advantage. The only possible disadvantage is that it is much longer and heavier than the standard stock when used with the smaller dies.

RENEW PROPOSAL FOR CANAL FROM NORTH SEA TO BALTIC

Interest in the proposal to build a Danish ship canal from Esbjerg on the North Sea to Kolding on the Baltic has again been aroused by the reunion of North Schleswig with Denmark. The proposed route lies just north of the former international boundary. Because of the character of the country, the cost of a lock canal would not be prohibitive and it would form a valuable short cut between countries bordering on the two seas, besides opening new eastern markets for the North Sea fisheries.

WOODEN FIGURES ATTRACT ATTENTION TO WINDOW

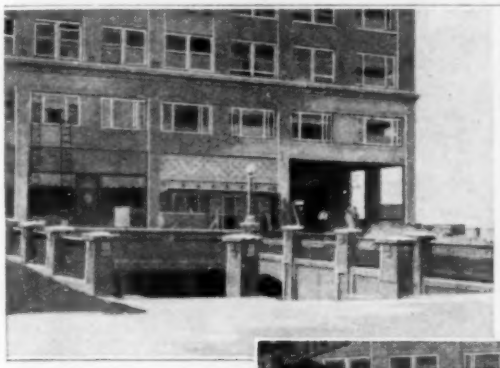
A laundry in a western city has hit upon a most unusual way of attracting


I'm told that this laundry
makes a practice of turning
the worn cuffs of a man's
shirt without charge.
Why certainly. That's why I
have always sent your shirts
here to be laundered. They do
it better and it saves my—
Time.

This Novel Family Group Attracts People to the Window All Day, and is Easily Carried In at Night When Its Work is Finished

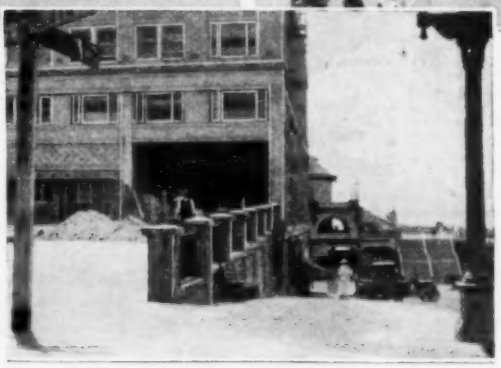
attention to signs displayed in its windows. Figures of a man, a woman, a boy, and a dog, cut from 1-in. boards, fixed on wooden disks, and brightly hand-painted, are placed in front of the window, during the day, as if looking in at the sign.

OFFICE-THEATER BUILDING HAS THREE FIRST FLOORS



Third-Floor Street Entrance: The Steps Lead Down to the Lower Floors

The Sloping Street, Showing How There Are Street Entrances to Three Floors



Looking down the Street at the Side of the Building from the Upper Level to the Beach: The Large Entrance Is That of the Theater

The sharp slope of the business streets of Long Beach, Calif., to the amusement area at the water's edge is responsible for an architectural novelty in the form of a large theater located on the third floor of an office building, yet with its orchestra floor at street level. The building, of recent erection, occupies the entire end of the block. The first floor fronts on a street at the amusement-area level, the third fronts on a street of the higher, business section. The second floor is directly accessible through an entrance on the third sloping street which intersects the first two. The owners of the new building receive practically first-floor rents for the first, the third, and part of the second story.

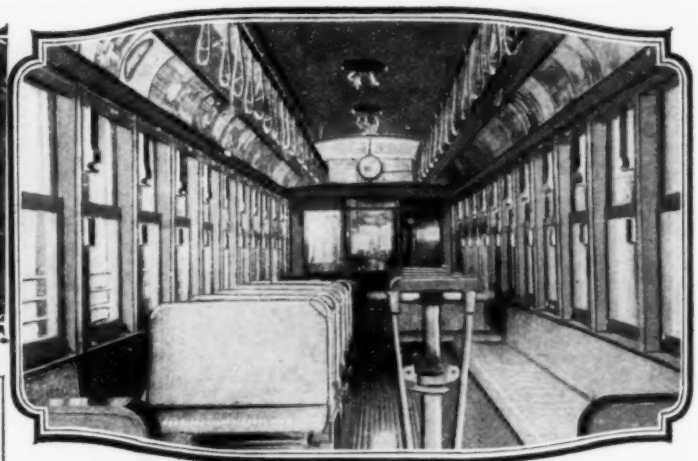
NEW TRUCK HANDLES AGGREGATES EFFICIENTLY

Loads of aggregate, such as sand, stone, slag, etc., generally used in the building of roads, foundations, and various other concrete constructions, are efficiently handled by a newly designed auto truck. Two end-dump hoppers, with a total load capacity of 5,000 to 6,000 lb., are located on the chassis, which has a very short wheelbase to facilitate turning. These hoppers dump their loads by gravity and are fitted with suitable springs to prevent damaging rebound, sidesway, and similar abusive shocks, and the strains caused by the loading of only one hopper. Trips are provided whereby the operator may dump either load as desired.

The Two-Hopper Dump Truck: The Loaded Hopper, at the Left, Is in the Normal Carrying Position. At Its Front End can be Seen the Shock-Absorbing Spring. The Hopper at the Right has Just been Dumped by Gravity

CIVIC FEATURES THAT PROMOTE THE COMFORT

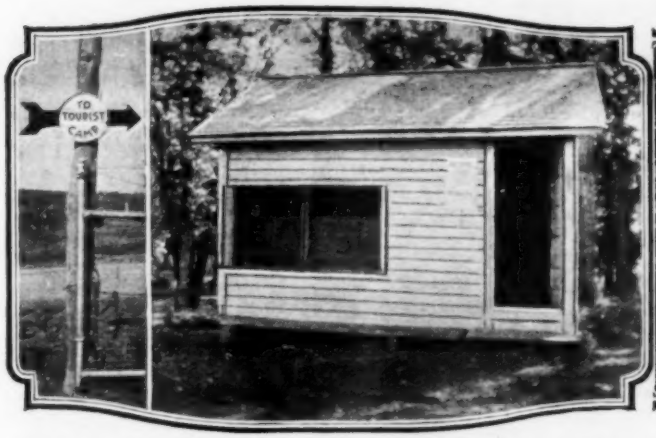
Reproduction of a Sign That Confronts the Automobile Drivers on All the Roads Leading into the Village of Richmond, Michigan: With Such a Courteous Warning, Any Driver Who Exceeds the Speed Limit Deserves to See the Village Jail, and to Continue Seeing It for a Longer Time Than might Be Altogether Agreeable



On Each of the Pilasters between the Windows of This Street Car Is a Nickel-in-the-Slot Machine. These Are Gum Venders, and They are So Designed That They Prevent the Depositing of a Coin When They Are Empty, or the Insertion of a Coin When They are Loaded. All the Street Cars in Little Rock, Arkansas, are Thus Equipped. About Four per Cent of the Passengers Purchase Gum

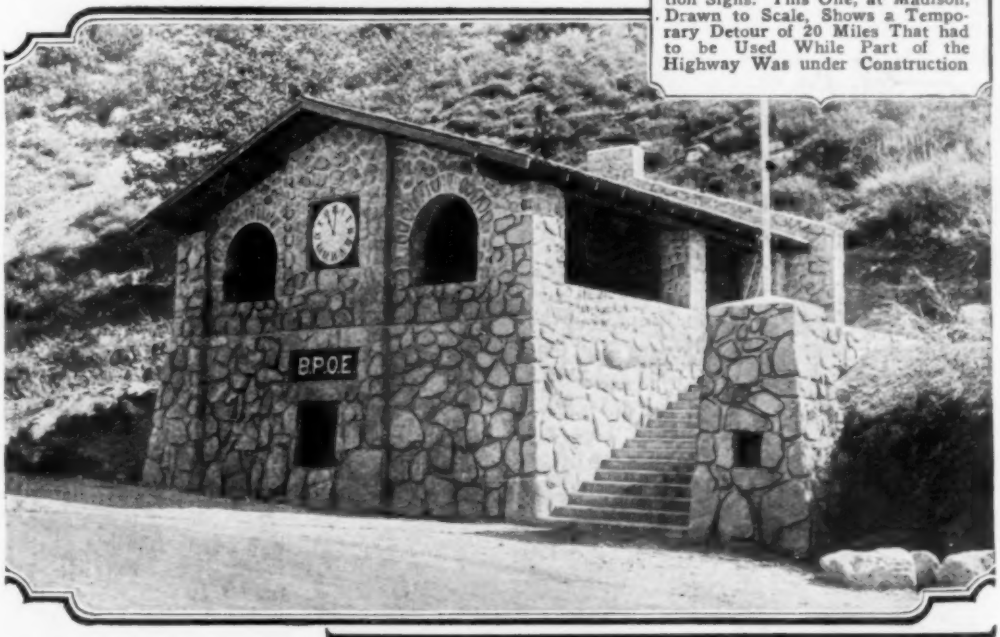
Municipal Band Stand in Library Park, Phoenix, Arizona: It Possesses, besides Its Architectural Beauty, Exceptional Acoustic Properties. By Actual Test It was Shown That a Match Dropped to the Floor from a Height of Five Feet could be Heard at a Distance of 150 Feet. A Speaker could be Heard at 250 Feet, and the Instrumental Music is Often Enjoyed by Citizens Seated on Their Porches Several Blocks Away. This Wonderful Transmission of Sound is Obtained by the Use of a Soundboard of Unusual Construction. It Is in the Form of a Compound Curve with the Same Radii as the Curve of the Proscenium Arch, Which Has a Width of 35 Feet and a Height of 16 Feet

AND ENJOYMENT OF VISITORS AND RESIDENTS

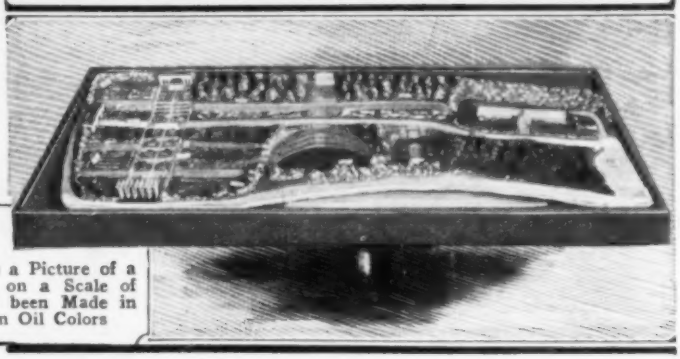


One of the Little Cabins Located on the Tourists' Camping Grounds at Fergus Falls, Minnesota, Which Is on the National Park Highway: In the Little House Tourists are Furnished with Free Use of Water, Lights, and a Cookstove. At the Left is Shown One of the Signs That Direct Tourists to the Camp

Each State Trunk Highway in Wisconsin Has an Individual Number. They are All Equipped with Exceptionally Informative Direction Signs. This One, at Madison, Drawn to Scale, Shows a Temporary Detour of 20 Miles That had to be Used While Part of the Highway Was under Construction



This Granite Clubhouse Is the Elks' Outpost at Camp Cajon on the National Old Trails Highway, and is Located in the Mountains 20 Miles North of San Bernardino, California. It was Erected by the Elks of Southern California for the Use of Elk Motorists Who Pass That Way



Portland, Oregon, Known as the "Rose City," Is to Have a New Municipal Rose Garden. This Is a Picture of a Model in Relief of the Garden, on a Scale of One Inch to 20 Feet, That has been Made in Plaster of Paris and Painted in Oil Colors

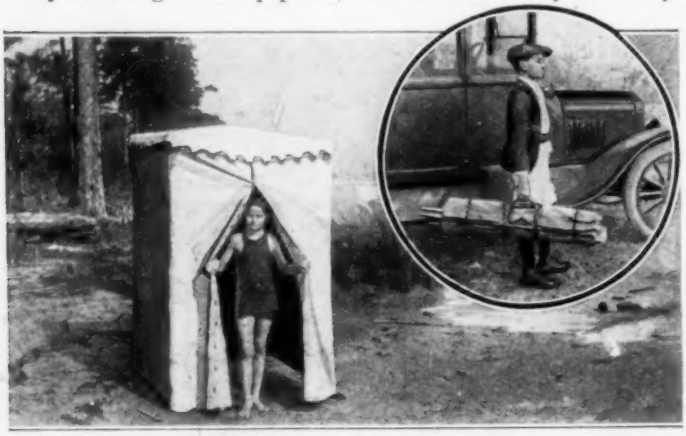
BOWLDERS GIVE FORTH MUSIC WHEN POUNDED WITH HAMMER

The last to be expected from a rock is music. Yet, strange as it may seem, melody bursts forth from a pile of rocks near Marblehead, Mass., when they are pounded in proper order with a hammer. While surveying some newly acquired property preparatory to clearing it for agricultural purposes, a farmer aimlessly tossed a rock at the neatly piled bowlders. He was surprised to find that they rang melodiously. Upon further investigation he found that each bowlder gave a different note. At once, he turned music student and learned to play tunes upon the rocks, which tourists may hear for a consideration. Many fanciful tales are current in the community as to the reason for the musical quality of the rocks, but thus far nothing in the nature of a satisfactory explanation has been given for this trick of nature.

There Is Nothing in the Appearance of These Piles of Rock to Suggest Their Peculiar Characteristic of Producing Musical Tones

PORTABLE CANVAS BATHHOUSE EASY TO CARRY AND ERECT

Portable canvas bathhouses are often an awkward and confusing combination of ropes, canvas, and long clumsy poles, but the latest type is simple. Four pointed, hinged poles are thrust into the ground at the corners of a 4-ft. square. They are hinged to top poles, which radiate to the corners from a block at the center of the roof. Over this frame the canvas is stretched. Folded, the bathhouse is only 42 in. long and 8 in. in diameter, and is easily carried on seashore picnics.



Showing the Portable Bathhouse Erected on the Beach: The 16 Square Feet of Space inside Is Sufficient for Dressing and Undressing. The Insert Shows the House Folded and Easily Carried by a Boy

EARTH TO MOON 100 TIMES WITH TELEPHONE WIRES

Although the telephone was put in use only a few years ago, the expansion of this industry has been remarkable, and the following facts will illustrate it. Enough wire has been strung to reach from the earth to the moon 100 times, making a total length of more than 23,900,000 miles. The lines of poles erected would reach around the earth nearly 15 times, a distance of 375,000 miles, and enough underground duct space has been installed for carrying cables, to reach from pole to pole through the center of the earth, more than six times, or a total length of more than 45,000 miles. Over 33,000,000 conversations take place every day.

X-RAYS REVEAL ATOMIC STRUCTURE OF MATTER

By ROGERS D. RUSK, M. A.

THOUGH atoms of matter are far too small to be made visible to the human eye, it is now possible to discover some of the chief characteristics of their nature and structure by means of X-rays. These characteristics show in a surprising manner how the atoms of all elementary substances are closely related to one another.

In the study of atoms an entirely new property of the X-ray is made use of. Every one of the 86 substances, known as elements, is affected in a different way by these rays. Each element reflects waves of a particular wave length, and these are called the characteristic X-rays for that element. Even in complex substances, the elements still reflect their own characteristic rays. Hence it is possible to analyze an unknown substance by measuring the characteristic X-rays it reflects.

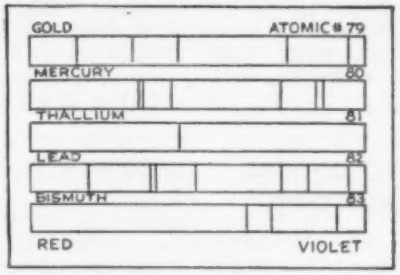


Fig. 1.—The Lines Produced by These Five Elements, When Observed in the Spectroscope, Are Complex and Unrelated

When the characteristic X-rays of different elements are compared, it is seen that they are related in a striking manner. The heavier the atom is, the shorter are the waves reflected by it. This is true in an exact ratio for the atoms of all the elements, so that the elements may be arranged in a series numbered from one to 92, according to the length of characteristic waves they reflect. There being only 86 elements, six blank places are left in the series, which presumably represent unknown elements. It is thought, if there are no heavier elements to be found beyond uranium —which is number 92— that there must be only six elements remaining undiscovered.

The comparison between the characteristic X-rays of a substance and the characteristic colors given off by the same substance in a flame, or in an electric arc or spark, is striking. When table salt (sodium chloride) is thrown into a flame, the brilliant orange-yellow color characteristic of sodium is given off. The majority of substances give off a greater complexity of colors appearing as brightly colored lines in the spectroscope, which separates the different colors. The various spectra thus produced may contain from one or two to several thousand lines, some of which can only be detected by a photographic plate. The lines, each representing waves of a definite length, exist in complicated series, and any relationship between the elements is extremely difficult to trace. On the other hand, the characteristic X-rays reflected by a substance are always few in number, simple in arrangement, and exhibit a definite and obvious relationship.

In Fig. 1 the chief lines in the visible spectrum are shown for gold, mercury, thallium, lead, and bismuth. The complexity and lack of simple relation between these spectra are obvious. In Fig. 2 the X-ray spectra for the same elements are shown. The order and relationship are evident. The lines produced by these elements represent wave lengths belonging to what is called the L-series. All known elements give lines in the X-ray spectra falling in this series or in a similar series called the K-series, with the exception of those elements which give lines falling in both series. Not only is the relationship of the elements thus exhibited a qualitative one, but it is mathematically quite precise, and may be stated more scientifically as follows: The square roots of the frequencies —or rates of vibration —of the characteristic rays are in the same ratio as the whole numbers from one to 92. The scientist who discovered the above relationship called these numbers the "atomic numbers" of the elements. When arranged by these numbers, it is found that all the chemical and physical properties of the elements occur in a definite order, indicating the close relationship of the elements. The fact that this order is more perfect than that obtained by any other arrangement of the elements, shows it is based on something fundamental.

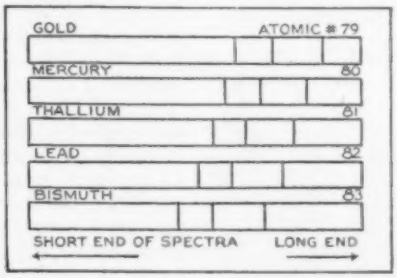


Fig. 2.—In the X-Ray Spectra of the Same Elements, the Lines Have a Distinct Relation and Fall in Regular Series

The reason these characteristic radia-

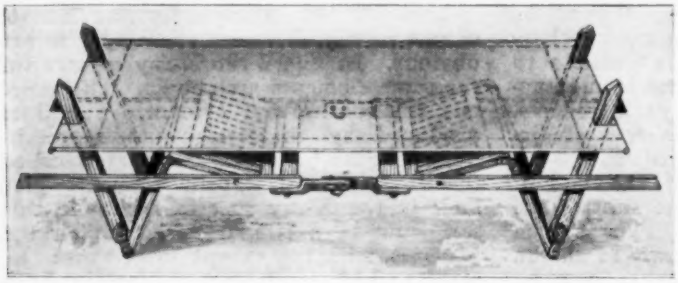
tions of the elements represent their properties so markedly is that X-ray waves are so small that instead of being reflected from the surface of the substance on which they fall, they are reflected by the individual atoms. Compared with X-ray waves, the atoms are large, and even the most highly polished surface is only a rough group of atoms. Each atom reflects a wave, but it can only reflect a wave length it is in tune with. Hence, because heavy objects will vibrate faster than light ones, the rate of vibration increases with the atomic weight of the elements, and the wave length decreases.

The relation existing between the elements is further proved by the many discoveries concerning the electrical nature of matter. It appears that the atoms of all the elements are composed of different numbers of electrical charges in different groupings. Several famous experiments even indicate that the atomic numbers are equal to half the number of free positive or negative charges in the respective atoms. And so it is that X-rays have helped us unlock the secrets of the atoms and aided us in our efforts to answer the eternal question:

What is matter?

USES TWO FOLDING CHAIRS TO MAKE PORTABLE COT

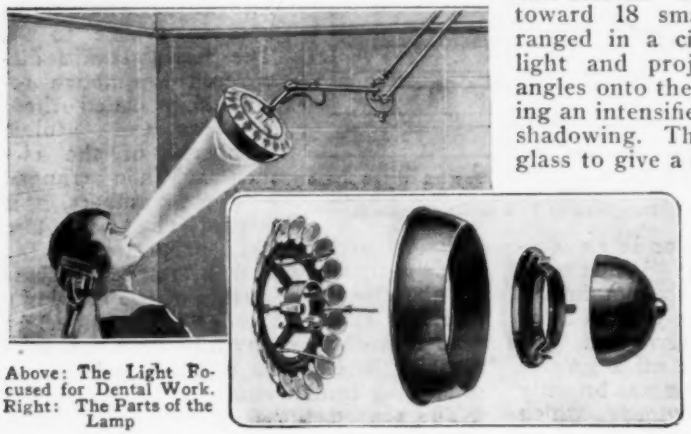
Light and portable cots have appeared on the market in several forms, but most of them are useful for no other purpose. A Porto Rican inventor now has devised a method of using two ordinary folding chairs as the temporary frame of such a cot. The chairs are placed with their backs horizontal and turned toward each other, and rigidly connected by means of two hinged braces of ¾ by ⅛-in. metal. A canvas strip, 6 ft. 3 in. long and 12 in. wider than the chair seats, with wooden stretchers across its ends, is then hung on the upturned front legs of the chairs, which enter slots in the fabric. The bed so made is claimed to support 600 lb. or more. It is made in various lengths for children or grown-ups.



Portable Cot Made by Connecting Two Folding Chairs with Metal Braces and Hanging a Canvas Bed on the Upturned Front Legs

SPECIAL LIGHT FOR OPERATING ROOMS AND DENTAL OFFICES

An improved lighting outfit for the use of dentists and surgeons in the operating room has recently been placed on the market. The source of light is a 100-watt stereopticon bulb, the rays from which are prevented from reaching the eyes of the operator or patient by means of front and side shields. They are directed backward toward 18 small, separate mirrors arranged in a circle, which converge the light and project it from 18 different angles onto the proper spot, thus producing an intensified light with a minimum of shadowing. The mirrors are made of blue glass to give a color value similar to daylight. The lamp is made of aluminum and is mounted on an adjustable arm.



Above: The Light Focused for Dental Work. Right: The Parts of the Lamp

¶United States gold coins, which were taken up three years ago, will be returned to circulation to test whether people prefer gold currency.

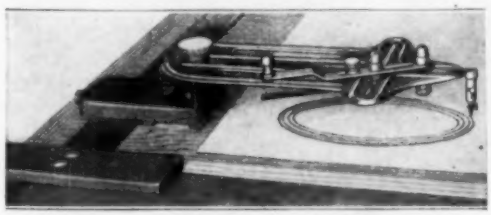
Scow That is Propelled by the Automobile near Its Stern: The Rear Wheels Have Cleats on Them like Tractor Wheels. These Cleats Engage Endless Chains That Pass over Octagonal-Shaped Pulleys on Either Side of the Paddle Wheel, and Thus Drive It

SCOWLIKE VESSEL IN ALASKA PROPELLED BY AUTOMOBILE

One automobile is frequently used to tow another, or any overland vehicle, and it is a practical idea to use an automobile for propelling a floating vessel. Such a craft is actually in operation in Alaska. The vessel is a flat-bottomed scow, decked to carry near its stern an automobile, over which is a framed housing. At the stern is a paddle wheel mounted on a shaft which is octagonal in cross section on either side of the wheel. These octagonal "drums" line up with the rear driving wheels of the automobile, which are preferably in the form of tractor wheels, having cleats that engage the links of a chain which is used for driving the paddle wheel. Astern of the latter is a rudder which is operated through a series of lines and guides by a steering wheel located near the front part of the automobile, so that it can be operated by the pilot in the driver's seat. The boat carries 30 to 35 tons of freight, and has been navigated for some time with entire satisfaction.

LABOR-SAVING INSTRUMENT FOR THE DRAFTSMAN

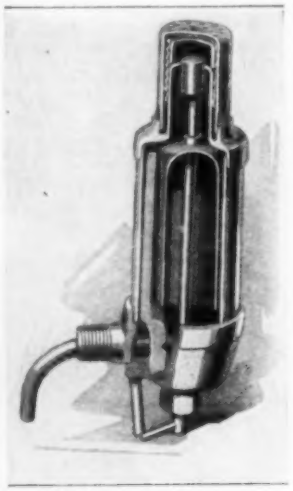
Every draftsman knows how much work there is in plotting or laying out an oval or ellipse. There is now on the market a new ellipsograph, neat and compact in appearance, that will draw any ellipse with pencil or pen on paper, in a most satisfactory manner, and which can also be used in photographic work with a scriber or knife to cut or strip a negative. On a drawing board, it is used in combination with the T-square, to which it is attached by means of a thumbscrew. It will draw an ellipse of any size and shape within its capacity.

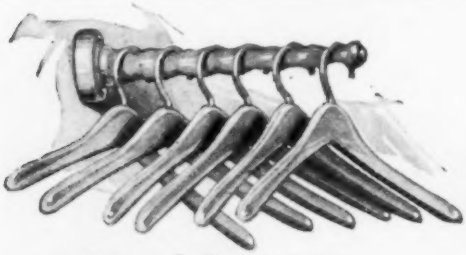


Instrument for Drawing with Pen or Pencil, Any Ellipse or Oval When Attached to a T-Square on a Drawing Board

VALVE FOR STEAM RADIATORS HUMIDIFIES THE AIR

An attachment, in place of the ordinary air valve, on a steam radiator maintains the relative amount of moisture in the air requisite for health and comfort in a steam-heated room. It possesses, besides, the advantage of eliminating all possibility of any hissing noise from escaping steam, or of leakage of water from condensed steam out of the valve onto the floor. A float automatically opens or closes the valve so that there is never an excess of steam, and just enough properly to humidify the air is allowed to escape from a perforated cap. A small tube leads from the interior through its connecting nipple downward into the radiator, into which all the condensed steam is drained.



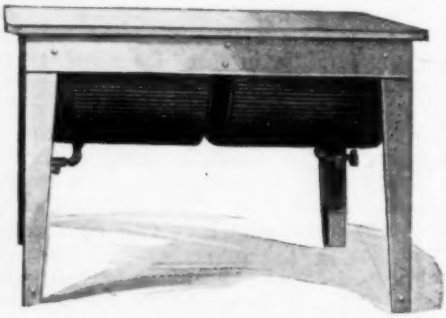


To Hold a Kettle under the Faucet While Filling It, a Small Wire Device Is Convenient. It may be Fitted to Any Faucet by Tightening or Loosening the Wingnut

A Notched Pole, Screwed to the Wall, is Used to Support Clothes Hangers for Infants' Wear. The Set is Enameled and may be Had in Pink, Blue, or White

This One-Piece Aluminum Cake-Shell Pan Gives an Evenly Baked Shell for Fruit and Other Fillings

If a Bucket is Equipped with This New Spring-Compressed Roller Device, It Is Easy to Wring the Special Mop Supplied with It



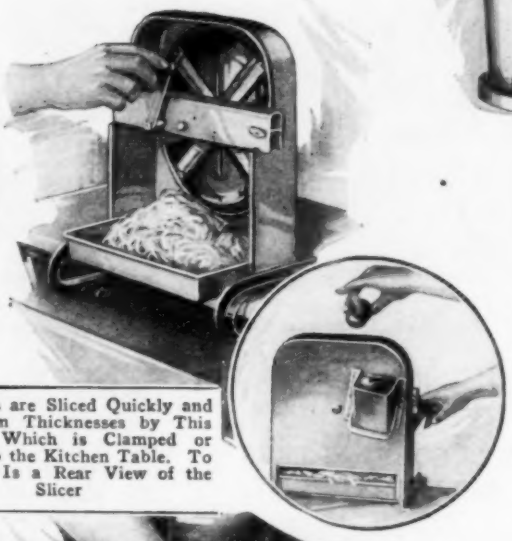
Two Galvanized-Iron Washtubs, Corrugated to Serve Also as Washboards, are Converted into a Kitchen Table by Means of a Removable Porcelain Top

An Overstuffed Davenport Has a Sliding Shelf with Casters, to be Pulled Out at Night. The Hinged Cushions, Folded Over onto the Shelf, Make a Comfortable Bed

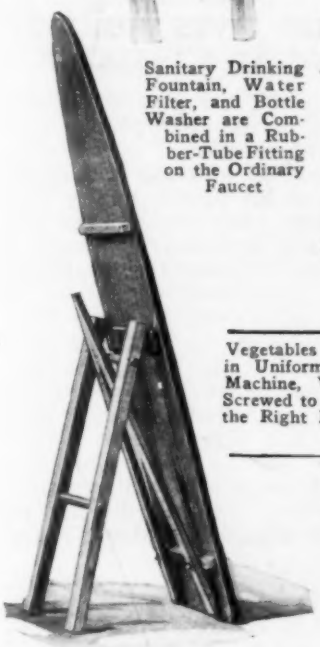
Anyone wishing further information on devices described in the editorial pages can

Sanitary Drinking Fountain, Water Filter, and Bottle Washer are Combined in a Rubber-Tube Fitting on the Ordinary Faucet

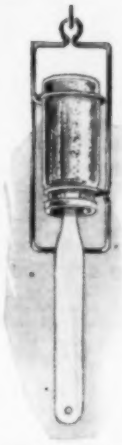
An Electric Cup That will Hold Any Bell-Shaped Glass, Heats Liquids Quickly, can be Set for Varying Degrees of Heat, and cannot Overheat



Vegetables are Sliced Quickly and in Uniform Thicknesses by This Machine, Which is Clamped or Screwed to the Kitchen Table. To the Right Is a Rear View of the Slicer

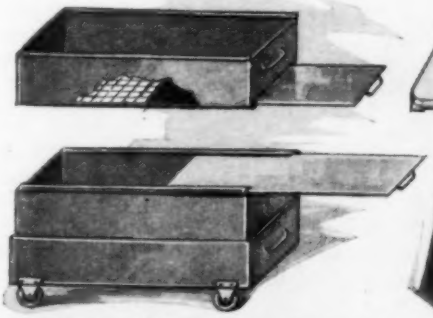


Clamped to the Edge of a Table, This Folding Ironing Board will Not Wabble, and It can be Adjusted to Any Height



Above: An Inverted Bottle, in a Wire Holder, Keeps a Toothbrush Clean but Allows It Air Space for Drying

Left: Dusting is Made Easy by a Small Electric Vacuum Brush. The Dust Bag, in the Handle, is Cleaned by Removing the Cap and Turning on the Motor

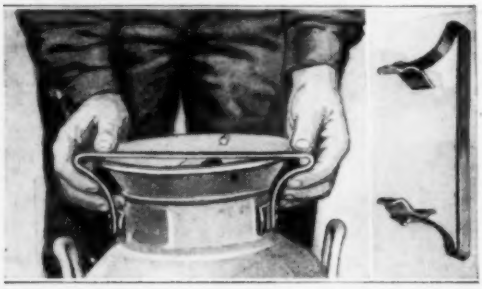


The Ash Pan with the Screen Bottom is Placed in the Stove with the Slide under the Screen. When Full, It is Set into the Other Pan and the Slide Placed on Top Till the Ashes are Sifted

Folded, This Attractive Table can be Kept in a Closet, behind a Door, or in Any Out-of-the-Way Place. The Top is Made in One Piece, of White Porcelain Enamel

SAFETY CLAMP HOLDS LID OF MILK CAN TIGHTLY

A new type of safety clamp, made from three pieces of spring steel riveted together, fits tightly over the lid and neck of a milk can, holding the lid firmly down. The invention was made by a Seattle milk-wagon driver, and cans have been dropped more than 10 ft. to demonstrate the efficiency of the gripping straps.



This Simple Device Insures a Tight-Fitting Lid When Used on a Milk Can. It is Shown in Detail at the Right

GUN MAKES GOLFING TEES OF ANY DESIRED HEIGHT

Golfing tees are now being made with a so-called "gun," instead of in the usual way by hand. It is said to make the tees better and more quickly. It has a short barrel which is pressed into the sand box and filled. Inside the barrel is a plunger on a spindle with a knob on top, which is used to push the tee out, and deposit it on the ground. The plunger can be adjusted in the barrel to make the tee of any height.

THE CENTENARY OF THE DEATH OF THE LIFEBOAT INVENTOR

September 28 was the centenary of the death of the inventor of the lifeboat, William Wouldhave, of South Shields, Eng. About 30 years previously he had, with his own hands, made his first model, which was the forerunner of the modern unsinkable lifeboat. Its unsinkability was caused by the use of air-tight compartments fore and aft. The same principle has been applied to boats which have saved countless lives, as notably instanced, in England, in one with a record of 1,028. Wouldhave was a house painter by trade, and was in no way connected with the sea. He died, as he had lived, a poor man. At his birthplace his original model is preserved as a memorial.

INSTRUMENT GIVES HUMIDITY READINGS AT A DISTANCE

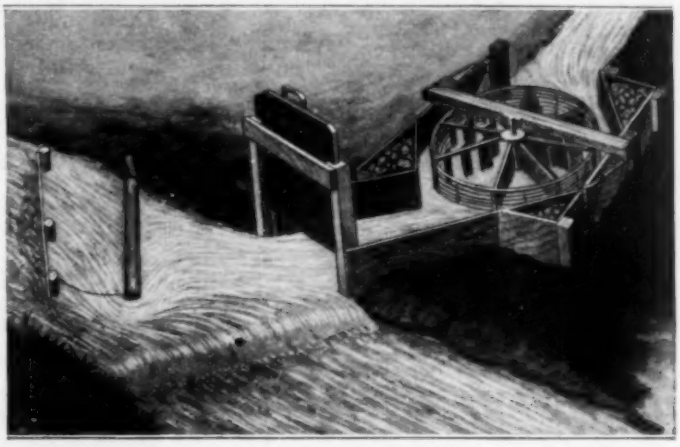
In cotton mills, refrigerating plants, storage rooms for tobacco, grain, paper, and other material affected by moisture, the exact degree of humidity existing in various parts of the plants, at any time, has hitherto been ascertained by the well-known wet and dry-bulb thermometer method. A new instrument, in the nature of an electric hygrometer, is now on the market, which gives direct readings of the relative humidity at any distance from the room under control. A thermocouple, one end of which is kept wet by a muslin wick from a cup of distilled water, takes the place of the thermometer. These thermocouples may be distributed about the plant and are wired to the reading instrument, which registers directly the degree of humidity in the various rooms.

SELF-CLEANING CARBIDE LAMP NOW AVAILABLE TO MINERS

A carbide lamp that practically cleans itself, is an improvement over the old-style lamp, which required the using of a wire to clear the burner of clogging soot or carbon. On the improved lamp, the burner is cleaned by simply pressing a button. The self-cleaning lamp should be a timesaver, and should increase the efficiency of the miners, as well as avert accidents, because it does away with all danger of being caught in underground darkness.

SCREEN KEEPS FISH OUT OF IRRIGATION DITCHES

Various state laws require screens to prevent the destruction of fish through entering irrigation ditches. A new device seems to meet these requirements, and also excludes drift, without interfering with the flow of water. Fenders, on piling, part way across the main stream, deflect heavy drift past the intake, while below them a wooden float deflects any drift passing the fenders. Fish and small drift are excluded by a revolving screen set inside the intake. The water is directed to one side of a wheel, pivoted above and below, and having spokes of angle iron. Wings, of screening, attached to the spokes, are pressed against them by the flow which rotates the wheel. On the opposite side they turn edgewise. The wheel frame is covered with screening. On each side, trash gates, with wire fingers, continually brush the surface of the wheel to keep it clear of any obstruction.



Heavy Drift is Deflected past the Intake of an Irrigation Ditch by the Fenders, on Piling, in the Main Stream, While the Revolving Wheel inside the Intake Excludes Fish and Trash

COMPANY CLEANS AND REPAIRS ITS MESSENGERS' UNIFORMS

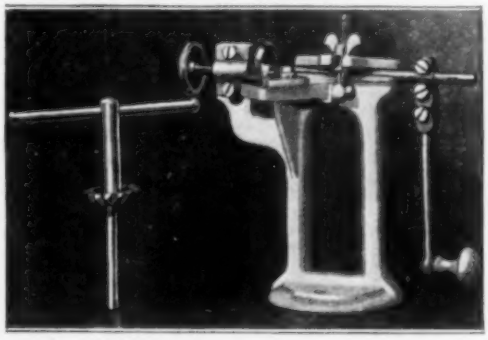
One of the telegraph companies keeps its messenger boys looking neat and clean by maintaining, at San Francisco, Calif., a depot where the boys' uniforms are cleaned, pressed, and repaired about once every two weeks. This depot handles approximately 5,000 suits a year, including those worn by messengers in all the cities of northern California. Suits from other cities are sent in and returned by parcel post, in cartons holding six.

CONSTANT GRIP NOT REQUIRED BY SELF-LOCKING PLIER

One grip of the hand is all that is necessary to hold securely anything grasped by the jaws of an ingenious self-locking plier. There is no need to maintain any pressure on the handles, as in any ordinary plier. The self-locking device retains indefinitely the pressure of the first grip. To relieve this grip, the handles are opened in the usual way.

VALVE-REFACING LATHE SHOWS HIGH DEGREE OF EFFICIENCY

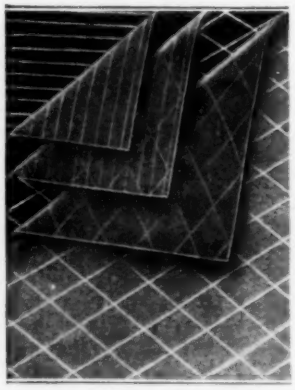
A simple though universally adjustable valve-refacing lathe has been developed, that shows a high degree of efficiency, both in accuracy and speed. The lathe can be mounted upon any bench or held in a vise, and is adjustable to take any valve from ¼ to ½-in. stem diameter, and any valve head up to 2¾ in. in diameter. Thus it has a great range of work in the automobile field, and should be a very popular tool.



Refacing and Reseating Tools Shown with Valve Inserted and Ready for Refacing Process: The Reseating Tool is Shown at the Left

WRAPPING PAPERS ARE WATER, DUST, AND VERMIN-PROOF

The recent ruling that automobile tires must be wrapped in waterproof paper for shipping, has been largely responsible for the development of new types of paper. One of these is a paper made in two layers cemented together with asphalt cement. It is also made with cotton cord laid in 1-in. diagonals, or ⅜-in. parallels, between the layers, making it practically untearable; or with wire substituted for the cord to increase its strength. For baling purposes, the two types of corded paper are joined with asphalt cement to form a nine-ply paper, consisting of four layers of paper, two layers of cord, and three layers of asphalt cement. It is entirely proof against water, dust, moths, rats, and odors, and is said to be superior to burlap as well as cheaper.



A Nine-Ply Sheet of Paper, Cord, and Asphalt Cement for Baling

This Type of Paper will Stretch to Shape for Lining Barrels

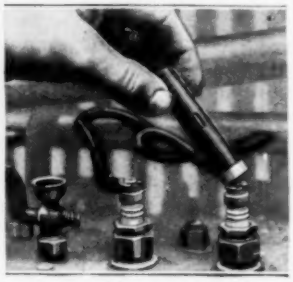
Another type of paper has two layers joined with cement and crimped to three-fourths its natural length. Being capable of stretching one-third, without breaking, it is particularly suitable as a lining for bags, barrels, and bales.

REGULATIONS SAFEGUARDING SHIPS AGAINST FIRES

With the object of fire prevention on ships, the Board of Trade, in England, has issued a circular embodying its requirements as to the means of dealing with outbreaks of fire. Passenger ships, fitted for oil fuel, must have, besides the usual water service, protection in the lower part of the boiler room by means of pipes perforated for the emission of steam, controlled from outside of the boiler room. There must also be means of extinguishing fire with sand or other suitable material of that nature.

RARE ELEMENT UTILIZED IN SPARK-PLUG TESTER

Neon, one of the rarest elements of the air, has the peculiar characteristic of glowing bright red when an electric current passes through it. This has been utilized in a new spark-plug tester, consisting of a hard-rubber shell that contains a small glass tube of neon. When the metal cap, sealing the tube, touches a spark plug, the action of the neon quickly shows whether the plug is working or not.



REGULATOR TO CONTROL GASES IN OPERATION OF TORCHES

A new regulator for the control and delivery of acetylene, oxygen, hydrogen, and other high-pressure gases in connection with their use in torches, is now on the market. It maintains uniformly any predetermined pressure independently of any variation in the high-pressure source of supply, or in the consumption of the gases at the torch. The pressure is indicated on two finely graduated gauges, and is regulated by means of an adjusting key. The regulator is very simple, with few operating parts, and is exceptionally small in size and weight. Interchangeable gauges are provided that are adapted to the various gases and types of containers.

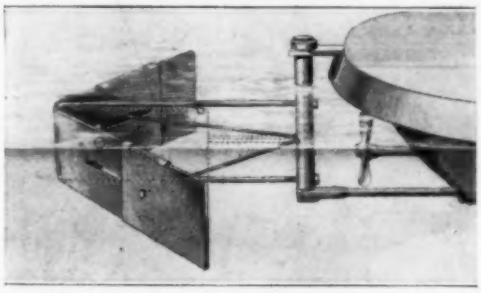
PUBLIC TASTE WILL BE STUDIED IN TRAINING OF BUYERS

Acting upon the assumption that the wholesale buyer should come in more direct contact with the needs and desires of the buying public, the University of London has instituted a three-year course, upon the students of which will be conferred the "Degree of Commerce." Under modern commercial conditions, the buying public is separated from the manufacturer by numerous distributors, wholesale and retail. The wholesale buyer must accurately gauge the wants of the buying public.

The degree-of-commerce course has been created for the purpose of thoroughly training the student along the lines of his particular field of buying. The advantage of this course is apparent, and it should be an innovation of benefit to the manufacturer, wholesale buyer, retailer, and to the buying public.

EXPANDING RUDDER ACTS LIKE EMERGENCY BRAKE

An expanding rudder, for self-propelled boats, which when closed acts as an ordinary steering rudder, but upon being expanded stops the boat more quickly than by merely reversing the

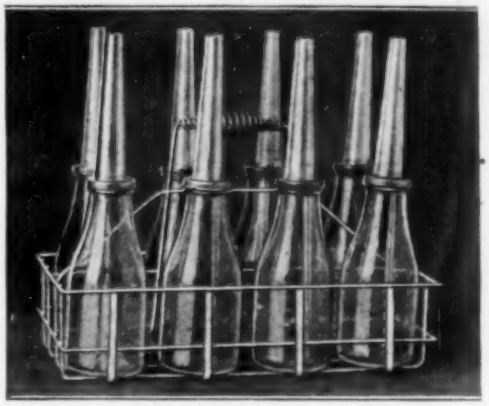


Expanding Rudder That, When Opened Out in the Manner Shown, Stops a Motorboat Much More Rapidly Than by Merely Reversing the Propeller

propeller, is now being manufactured in Canada. It is particularly applicable to small motorboats, as it occupies no space inboard, and is operated by the steering wheel and a pedal near it. Connected to the rudderpost, like an ordinary rudder, is a frame, with a plate on either side of it hinged at its rear end in such a manner that each plate can be swung outwardly at an angle to the plane of the frame, and thus offer such resistance to their motion through the water that they stop the boat in much the same manner as an emergency brake stops a motor car.

SIMPLE OIL DISPENSER QUICK AND ACCURATE

An efficient oil-dispensing outfit consists of a glass container, very much like the ordinary milk bottle, fitted with a ta-

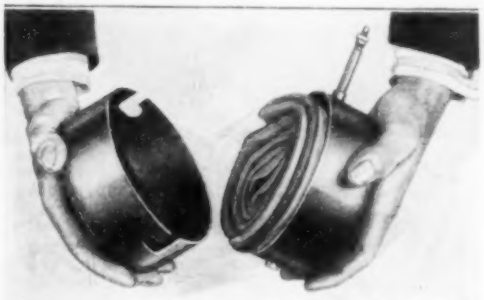


By Using an Outfit like This in an Auto-Service Station, Oil Tanks are Quickly and Easily Filled without Spilling

pered metal spout. A breather tube extends from the mouth of the tube inside to the bottom of the container. This equipment gives clean, quick, and accurate service, dispensing with the unsatisfactory measuring can and funnel method.

SHEET-METAL BOX PROTECTS EXTRA INNER TUBES

Extra inner tubes may be carried in the tool box, or anywhere on the automobile, and be protected from damage, dust, grease, and rotting, by placing them in a new inner-tube box. The tube is rolled up and placed in a drawn-steel shell, with the valve stem projecting. The cover, in the form of a bayonet joint, is held in place by the valve stem and a lug on the opposite side. The tube is slightly inflated to keep it from chafing.



An Inner Tube in Place in the Box: The Cover is Slipped On, and a Twist Holds It Tightly

Labor Day at Newport Beach, When a Thousand Wooden Blocks, Each with a Number on It, are Buried in the Sand: The Children are Lined Up, and at a Signal Scatter over the Beach, as Seen in the Picture, and Hunt for the Blocks. For Every Block There Is a Prize in the Form of a Doll, or Some Kind of Toy, and the Finders Run to the Convention Hall, Where Each Receives the Prize Corresponding to the Number on the Block. A Year Ago, a Block Which had been Buried in 1918 was Found, and the Finder Received the Present Which had Remained All That Time Awaiting Its Lucky Claimant

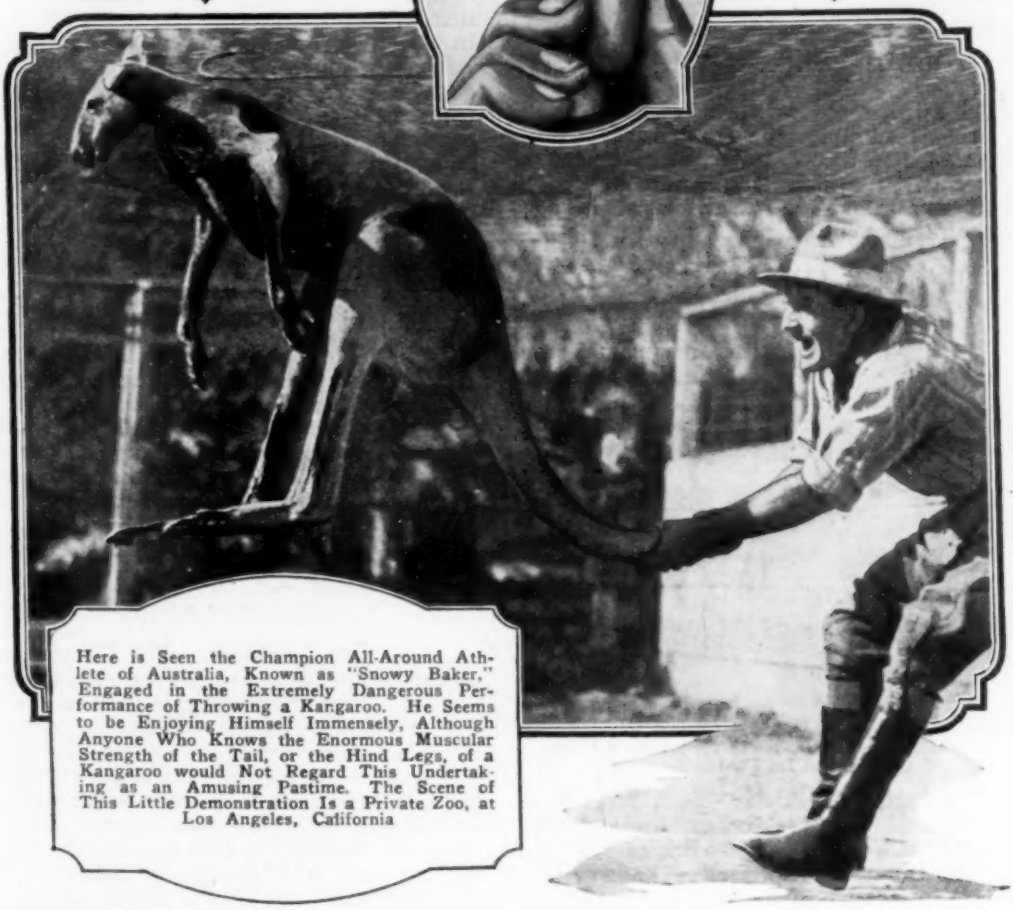
This Combination, When Opened Out as Seen to the Left, Is a Scooter for the Kiddies, and When Closed Up as Seen to the Right, Is a Walking Stick for the Grown-Ups. It is Thus Easily Transportable to a Park or Other Place Where a Child may Wish to Play with It. It is Made of Aluminum and Weighs Only Four Pounds. The Handle Is in Two Parts Which Fold Downward to Form a Seat That can be Used in Scooting

COPYRIGHT, KADEL & HERBERT

A Game of Skill and, Therefore, Interesting: The Idea Is to Move the Triangular Frame by Hand in Such a Manner That the Three Little Wire Snakes on the Bottom are Made to Wiggle from the Partly Inclosed Shamrock to the Three Points, as They are Shown in the Picture. A Wire Screen on Top Protects the Toy from Damage

This Is Not a Walrus, nor a Seahorse, nor Any Other Kind of Animal. It Is a Vegetable —a Sweet Potato That Grew in This Manner through a Buried Padlock. It was Dug from a Garden in Kansas and Photographed Just as It was Found

A Dog That Barks but does Not Bite: When the Rubber Bulb Held by the Fingers is Squeezed, the Dog's Head Snaps Its Jaws and Barks Merrily, Just like a Dog Greeting Its Master or Mistress. It Resembles the Bark of a Dog So Exactly That Everyone Who Hears It for the First Time is Surprised to See Only a Toy



Here is Seen the Champion All-Around Athlete of Australia, Known as "Snowy Baker," Engaged in the Extremely Dangerous Performance of Throwing a Kangaroo. He Seems to be Enjoying Himself Immensely, Although Anyone Who Knows the Enormous Muscular Strength of the Tail, or the Hind Legs, of a Kangaroo would Not Regard This Undertaking as an Amusing Pastime. The Scene of This Little Demonstration Is a Private Zoo, at Los Angeles, California

COPYRIGHT, UNDERWOOD & UNDERWOOD

DOUBLE SEAT IS INVENTED FOR GOLF OR GARDEN

A combination of two seats, which can be used on golf courses or elsewhere outdoors, has been invented by a Canadian.

This Seat Provides a Shelter for the Golfer from the Rays of the Hot Sun or from a Sudden Shower

An awning covers the whole, and hooks are placed upon the framework to support pails of sand, water, or other golfing necessities, which should not be exposed to the rain or sun. The awning also shades the resting golfer.

PILLS AND CORKS USED ON SIGN OF DOCTOR

A highly suggestive, ornamental, and useful sign hangs in front of the home

COPYRIGHT, TICHENOR NEWS PHOTO SERVICE

This Unusual Sign of Pills and Corks Is an Entirely Homemade Article, and is Thought to Be the Only One of Its Kind in Existence

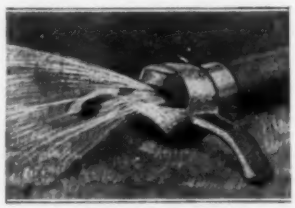
of a doctor in Poplar Bluff, Mo. It is composed of pills, corks, and surgical instruments, and is the work of the physician himself. So far as known, this is the only sign of its kind in existence.

CARD TEACHES SAFETY FIRST TO COUNTRY-ROAD PEDESTRIANS

In order to encourage safety first among people walking on country roads, Harry Park, of Portland, Ore., had a number of cards printed which he carries with him whenever he is touring. "Pedestrians should Walk on the Left-Hand Side of the Road, Thus Facing Approaching Machines—Safety Always," is printed on the cards in large black type. When he passes a person walking on the right side of the road, with his back to him, he sounds his horn to attract attention and throws out a card. Even if that person fails to pick the card up, some one will, and it will do its work in the campaign for reasonable caution. The idea does not apply, of course, to city traffic.

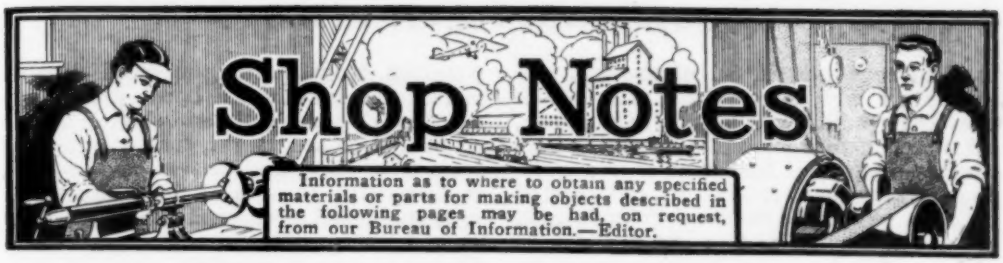
LAWN-SPRINKLING NOZZLE HAS FAN-SHAPED SPRAY

A lawn sprinkler for use as a hose nozzle, that has recently been introduced in the West, has some novel features. Like other such devices, it is screwed onto a hose, and laid on the ground, resting on the ends of two supporting arms. The outlet of the spraying nozzle has a slotted opening so shaped that it spreads the water into a semicircular fan-shaped spray, no water falling on the hose side of the nozzle. Thus the lawn can be sprinkled from the edge of a sidewalk without any danger of sprinkling passers-by, and for the same reason the nozzle is approachable from this side when it is desired to move it.



ELECTRICALLY WOUND CLOCK FOR AIRPLANES

An electrically wound clock for use in airplanes and balloons has recently been developed, and tested by the Bureau of Standards. It consists primarily of a watch movement with an electrical winding attachment operated from a three-cell, six-volt storage battery. The tests included its ability to stand severe vibration and temperature changes within a range from 120° above to 15° below zero Fahrenheit.


Shop Notes
Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

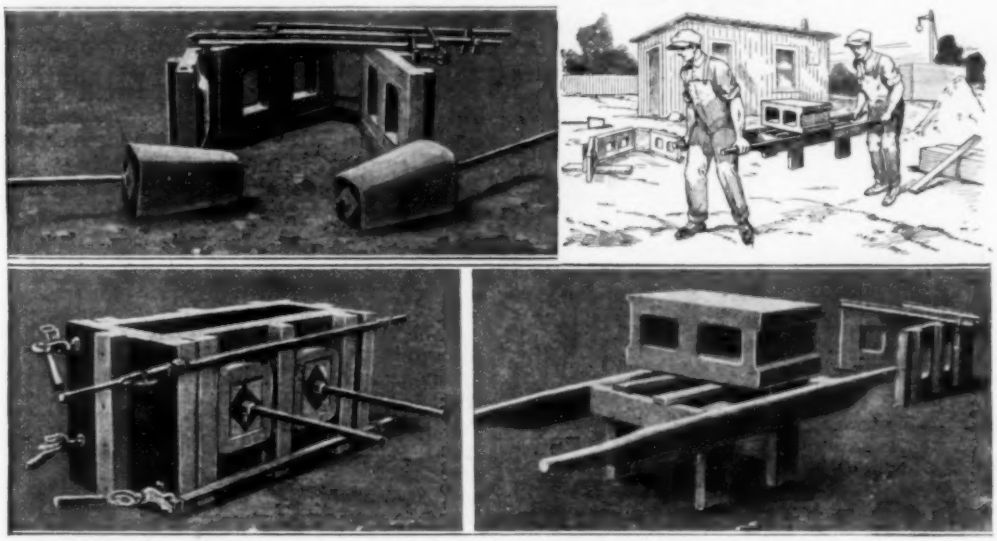
Mold for Making Concrete Blocks

By A. J. R. CURTIS

THE mold illustrated can be made from wood by any mechanic and used to produce concrete building blocks for quite a good-sized building. The bottom, ends, and sidepieces are made from thoroughly kiln-dried white pine, 2 in. thick, strengthened with 2-in. square cleats. The cores are merely tapered sections of 6 or 8-in. square posts. The wearing edges of the sides and ends are protected with strap iron, screws being used to attach both the cleats and strap-iron reinforcing. Handles of ½-in. rod or pipe through the cores are provided, so that they can be removed from the mold after the block has been cast. Carpenters' or cabinetmakers' quick-acting clamps provide the best means for holding the parts together rigidly, although simple strap-iron hooks and wooden wedges can be used if clamps are not available.

Before using the mold, it should be painted inside and out with any kind of light oil that will fill up the pores of the wood and keep out water. If the inside faces have been properly planed and sanded, the oil surfaces will produce correspondingly smooth surfaces on the blocks. Only enough free oil should be left on the forms to prevent the concrete from sticking, the surplus being removed with a piece of waste.

The blocks may be cast either face down or face up, as preferred, and it is recommended that only plain-face blocks be made, as they are simpler and better-looking than the rock-face block. If the face of the block is to be down, a facing mixture is first placed in the mold to a depth of ¾ in., and the remaining space in the mold box is filled with ordinary concrete, mixed as wet as possible, yet so that it will stand up without sagging when the mold is removed. If the facing is to be placed on the upper side, the mold



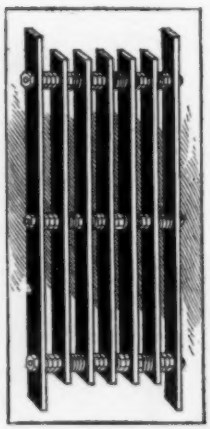
The Upper Photograph Shows the Concrete-Block Mold, Opened, with Its Cores and Clamps; Below, Left, the Clamps Applied and the Cores in Position to Cast a Concrete Block. The Face of the Block can Be at Either the Top or Bottom of the Mold. Right, One of the Blocks Cast in the Homemade Mold, Showing the Hollows at the Center. These Openings Make the Block Lighter and Improve Its Insulating Qualities

is filled to within ¾ in. of the top, and struck off with a template, after which the facing mixture is placed. Of course, all the concrete must be tamped thoroughly, and this is best done with a small foundry rammer, or one so constructed that the mixture is thoroughly compacted around the cores and in the corners.

The plain-concrete backing may be made of a mixture of 1 part cement to 3 or 4 parts of clean gravel, varying in size from minute particles to ¾-in. pieces. The facing should consist of a mixture of 1 part cement to 2 or 3 parts of white sand, marble dust, or granite, the proportion and color of the ingredients determining the color and texture of the finished article. Cement-stucco mixtures, in a variety of colors and textures, may be obtained from building-material dealers. After the block has been thoroughly compacted in the mold and the top struck or floated off, a straight, true pallet, made from 2-in. plank and cleated on the back, is clamped to the top of the mold, which is then turned over until the block rests on the pallet. The cores are then withdrawn, the mold carefully removed, and the block set away in a warm, moist place to season. The blocks should be carefully protected against sun, draft, and frost, preferably being stored where the temperature can be kept as high as possible and where the blocks can be sprinkled frequently, commencing as soon as this can be done without injury to the block. It is almost fatal to let blocks become dry during the first two weeks.

Engine Grates Made from Old Tires

While doing some threshing, the ashes were allowed to accumulate underneath the grates of the steam tractor, the result being a ruined set of grates. Not wanting to wait for several days until new grates could be received from the supply house, several old wagon tires were obtained, and, after cutting, were straightened out without heat. The iron bars thus obtained were cut into lengths to fit the grate racks, longer strips being provided at the sides for holding the grate in place. Three holes were drilled through each piece. The separate bars were spaced by old nuts and washers, the whole being held securely together by round rods, threaded on the ends, inserted through the holes, and drawn up tight with nuts.

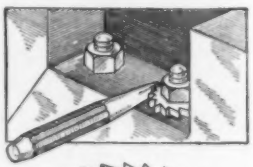


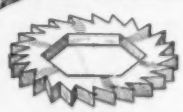
Tinning Small Work

The work to be tinned is placed in warm water, to which a little sulphuric acid has been added, to clean the pieces of grease and dirt. Some powdered sal ammoniac is then added to the water and vigorously stirred until entirely dissolved. The work is then removed, washed in clean water, and placed near the fire to dry. A shallow pan, such as a frying pan, is obtained, and the bottom perforated. This pan should be small enough to allow it to be dipped into the pot of melted tin. The work is placed in the bottom of this perforated container, and a little sal ammoniac is sprinkled over the surface of the melted metal; then, after all smoke from the metal has disappeared, dip the pan containing the articles into the tin, lift it out, and shake well to get rid of the excess metal, at the same time sprinkling a little sal ammoniac over the work, to prevent too thick a coating. The articles are cooled quickly by dumping them into water, which also produces a bright finish.

A Convenient Ratchet Wrench

The original ratchet wrench of the type shown was made by using the ratchet from an old chain drill, and an elaboration of the idea resulted in a complete set of such wrenches to fit standard-size nuts.





RATCHET

By making the wrenches from carbon steel and casehardening, it is possible to screw or unscrew nuts and bolts that are so located as to be inaccessible to wrenches of the usual kind. The nuts are screwed down by means of a drift and hammer, as shown; to unscrew the nut the wrench is turned over so that the teeth point in the opposite direction, the hammer and drift again being used.

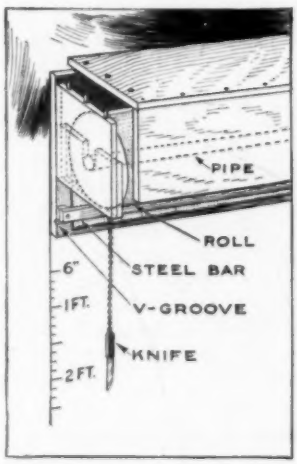
Removing Stains from Concrete

Stains on concrete and stucco are mostly caused by dirt and dust washed down from the windows. These can readily be removed by scrubbing with a heavy bristle or wire brush and water.

Occasionally stains are caused by iron dissolved in rain water. These are really rust stains, and come from iron piping, nails, etc. Often they resist scrubbing with plain water. In this case, a dilute solution of hydrochloric acid (muriatic acid) used with a plain bristle brush, is effective. After scrubbing, rinse well with clean water. Protect the hands with gloves when applying the acid.

A Reel for Drawing Paper

For most drafting rooms, detail paper is bought in large rolls that are heavy and awkward to handle when merely stood on end in a corner, as is quite often the case. By this system much paper is wasted through careless handling, and it was for the purpose of reducing this waste and placing the roll in a convenient position, that the reel in the drawing was devised. It was built as shown, the frame being screwed to the wall, and pieces of 1-in. material were attached inside each end as a support for the pipe roller. The top and front of the reel were made in a unit and held in place by dowels, so as to be readily removable. The paper, as it leaves the roll, runs underneath a ¼ by 1¼-in. iron bar that serves as a guide when cutting paper from the roll, assuring a smooth, square cut, which is also greatly facilitated by the V-groove in the backboard of the reel.



The device is mounted about 6 ft. above the floor, and a scale in feet and inches is painted on the wall, making it possible to draw out a sheet of the exact size required and cut it off quickly and smoothly, with square corners.—J. H. Kay, Cleveland, Ohio.

Limousine Sled for Winter Touring

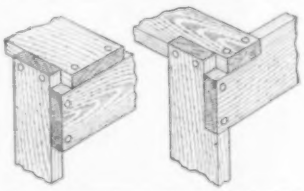
The limousine sled shown in the drawing is the product of a locality where winter comes early and stays late, and

A Limousine Sled, for Use in Localities Where Arctic Winters Are the Rule and Passable Roads the Exception at This Season of the Year

where roads, that are none too good normally, are even worse at this season. The runners of the sled are made of heavy plank, suitably crossbraced and shod with tire iron. The comfortable body is built to convenient dimensions and provided with windows on all sides, and a door. In this particular vehicle, a comfortably upholstered seat from an old automobile gives a touch of luxury.—John Hirdler, Minneapolis, Minn.

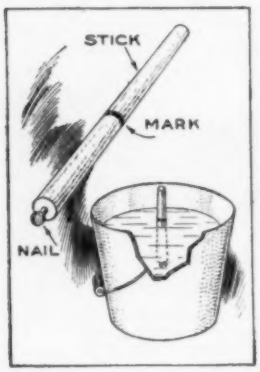
Making Crates of Maximum Strength

The annual waste and damage that are the direct results of packing and shipping goods in improperly made cases and crates amount to a staggering total. It has only been within comparatively recent times that serious thought has been given to the matter of correct packing and crating. In most boxes and crates, it will be noticed that a great deal of the box is fastened together by driving the nails in parallel to the grain. This is all wrong, and should be avoided, because the nails will pull out readily. The best way to get the maximum strength at the corners of a box or crate, where it is most needed, is accomplished by arranging the pieces at the corners in either of the two ways shown in the drawing, and driving the nails into the wood at right angles to the grain.



A Stick Hydrometer

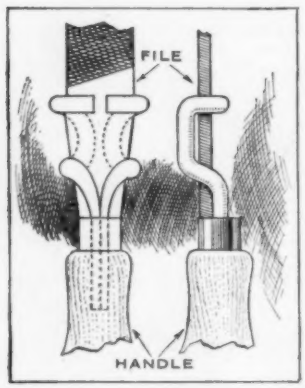
Due to the rapid evaporation of alcohol from the antifreezing solution in the automobile radiator, the owner is never quite certain as to the efficiency of his alcohol-water mixture, without frequent tests.



A simple test gauge, operated on the same principle as a hydrometer, can be made from a circular stick of wood, with a nail driven into one end to hold it upright. The proper alcohol-water mixture is made up, and the stick is inserted into the bucket, the depth to which it sinks being marked. The stick is kept either under the seat of the car or in the garage. Whenever there is any doubt as to the percentage of alcohol in the water, it is tested, and alcohol added until the test gauge sinks to the previously marked level.

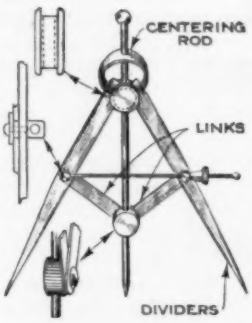
Flat-File Attachment

It is not generally known that a handle placed on the front end of a flat file greatly facilitates its use. Anyone who has used a flat, rough file for any length of time knows how awkward it is to keep on filing after the left hand has become sore and blistered from the continual contact with the file's rough surface. A good method of attaching such a handle is to bend a piece of drill rod to the shape shown in the drawing. After bending, grind off half the diameter of the two ends so that when brought together they can be driven tightly into a hole drilled in the wooden handle. The piece is then split at the front to form a spring grip. The front or split part of the attachment should be much narrower than the width of the file, so that when it is pushed on there will be sufficient tension to grip the file tightly. The lines showing the teeth on the end of the file have been omitted from the drawing for the sake of clearness; it is not necessary to grind off the teeth, although it may be found advisable to grind the edges of the file to a more abrupt taper. The size of drill rod to use will depend largely upon the size file with which it is to be used, ¼ to 5/16-in. stock being sufficiently heavy for 8 to 12-in. files.



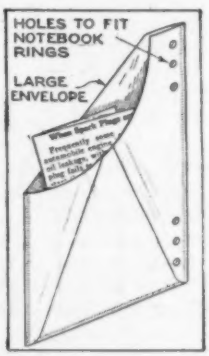
Self-Centering Dividers

A pair of machinists' dividers can be made self-centering by the simple addition of a perpendicular centering rod and a link arrangement, by means of which the rod is always held at the center. A hole is drilled through the spool and bow for the center rod, which is free to move vertically. This rod passes through a hole in the stud riveted at the center of the links. The links are fastened to the legs of the dividers, and, as the adjustment is changed, move up or down the centering rod.—Albert Hochheimer, West, Ia.

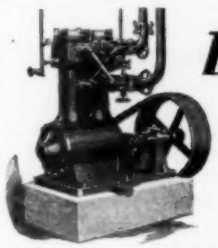


Pocket for Loose-Leaf Notebook

For carrying clippings, and similar small notes, in a loose-leaf notebook, a pocket can be added to the book, which will keep them all together and prevent them from dropping out each time the book is opened.



A heavy envelope of the right size is sealed and then cut as shown, the proper number of holes to fit the notebook rings being punched in the edge. If possible, metal eyelets should be inserted in the holes to add to the strength of the pocket and prevent its being easily torn out of the book.



Repairing Small Ammonia Compressors

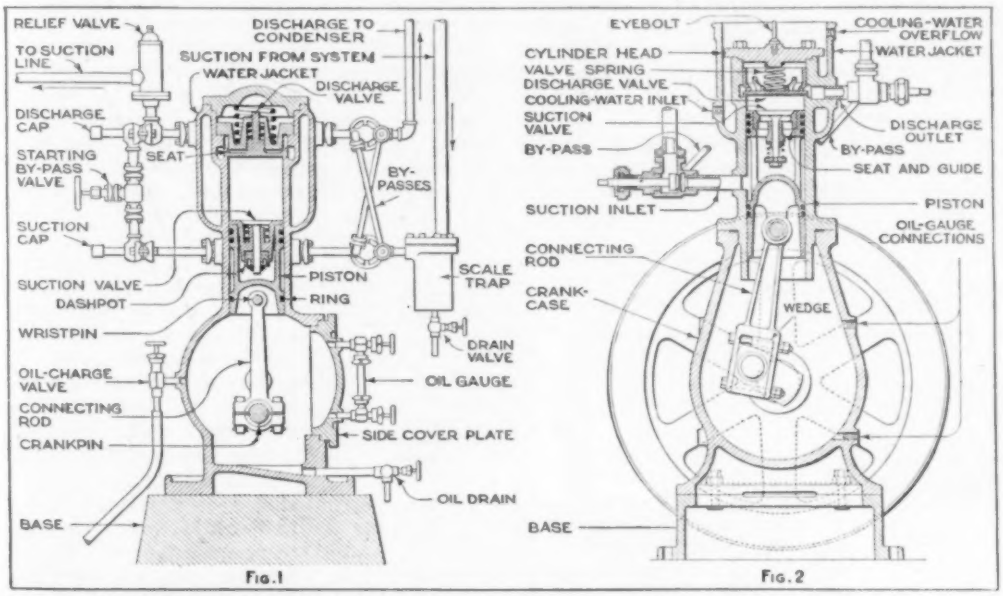
BY J. V. ROMIG

OWNERS of small ice plants are usually rather chary of undertaking the overhauling and repair of their compressors, although many are quite competent to perform the repair work if they understood just how to go about it. It is to give this instruction to owners, or repairmen unfamiliar with refrigeration equipment, that this article is written.

The first thing necessary is to go over all pipe connections, studying the plant thoroughly, until the operation of each part is completely understood, and a firm grasp of the method of controlling the ammonia obtained. It is surprising how easily the ammonia is made to do as desired, when the operation of the system is understood.

Compressors should be thoroughly examined and overhauled at least once a year, and the winter is the best time to do this, as, once the desired temperature has been attained in the cold-storage room, it will remain at a low degree much longer than in a warmer season. Figs. 1 and 2 show cross-sectional views of two typical compressors; these should be studied carefully so that the instructions may be followed intelligently.

When the desired temperature has been obtained in the storage boxes, ice-cream cabinets, ice tanks, or whatever the machine may be cooling, pump a good vacuum on the system, then close the line suction valves, one of which is shown in Fig. 3, and pump down again. Stop the compressor, then close valves A and B, Fig. 3, as tight as possible. There is now no pressure on the suction side, and the pressure remaining on the high-pressure side of the cylinder may be by-passed by opening the starting by-pass valve E, Fig. 3; the pressure will then equalize on both ends of the cylinder. Place a bucket of water below the hose on the oil-charge valve, Fig. 1, open the valve, and the ammonia in the cylinder will be absorbed by the water. Do not keep the hose in the water too long, or all the ammonia will be absorbed by the water,



Sections through Typical Small Single-Acting Ammonia Compressors: Note Carefully the Arrangement of the By-Passes, Suction and Discharge Valves. The Cross By-Pass Valves are Closed at All Times When the Machine is Running

and a vacuum may form in the cylinder, drawing in some of the water, and requiring subsequent sponging. Drain the oil from the crankcase, then take off the side cover plate and the cylinder heads; very little smell will be noticed if the instructions have been carried out carefully. Remove the connecting-rod nuts, caps, and shims, and turn the flywheel until the pistons are at the top of the stroke; then the discharge valve and false head, if such is fitted, can be removed, eyebolts inserted into the piston head, and the pistons and connecting rods drawn out. Carefully examine the suction-valve seats; if pitted badly, they must be reground, using fine emery and oil, as in grinding in automobile-engine valves. See also that the balancing springs on the suction valves exert just enough force to overcome the weight of the valves and dashpot plungers; if they are too "light," remove the cage, take out the valve, and stretch the spring until the proper tension is secured; if the spring holds the valve off its seat, compress it a little. Clean out any scale or grit that may be found around the piston cavities, then take the slip ring, used to compress the piston rings when inserting the piston into the cylinder, and slip it half over each ring in turn, observing how much the ring is open at the gap when compressed. If the gap measures more than .02 in., new rings should be fitted.

Rings that have an angular oil groove cut in the outer face give the best results, and should be fitted so that the gap is no wider than .006 in. "Stagger" the gaps, that is, see that the gaps are not in line when inserting the piston into the cylinder, and that they stay staggered. Next examine the discharge valve; this usually shows some pitting, due to particles of scale getting between valve and seat; if necessary, regrind to a continuous surface with emery and oil. By a continuous surface is meant one in which there may be some pits, but which do not overlap each other, so that the valve will not leak. Too much emphasis cannot be laid upon the necessity of doing this part of the work well; the writer has found that very many cases of poor operation were due to bad high-pressure seats.

Replace the pistons in their proper cylinders, and, by turning to the top of the stroke, see how much clearance there is between the piston head and the top of the cylinder walls; if this is more than .02 in., the top halves of the connecting-rod bearings are worn, and should be replaced. Too great clearance is also a prolific source of inefficiency, as the space holds a comparatively large volume of highly compressed gas, and allows it to expand on the downstroke, partly filling the cylinder. Allow as little clearance as possible without permitting the metals to touch. All bearings should be tested for wear by placing a pinch bar under the shaft, in the case of the shaft bearings, or under the cap, in the case of the connecting-rod bearings, and, using a block as a fulcrum, raising the shaft or piston assembly; the bearings must be tight enough so that no play will be felt. If too much end play exists in the crankshaft, this can be taken up by a fiber washer, placed between the cover plate and crank web.

The key in the flywheel should be tested for shake, as it is very likely to work loose; if allowed to run when loose, it will develop a bad knock. Remove all accumulated dirt in the crankcase, and reassemble. After assembling, turn the machine over slowly to see that everything is clear, then pump out the air entrapped in the cylinder through the discharge cap, Fig. 1. If, while the machine was open, a leak in either of the main control valves A or B, Fig. 3, was noticed, it will be found neces-

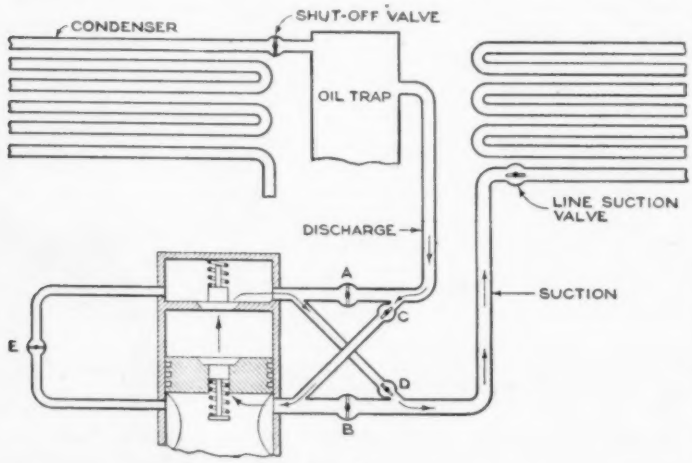


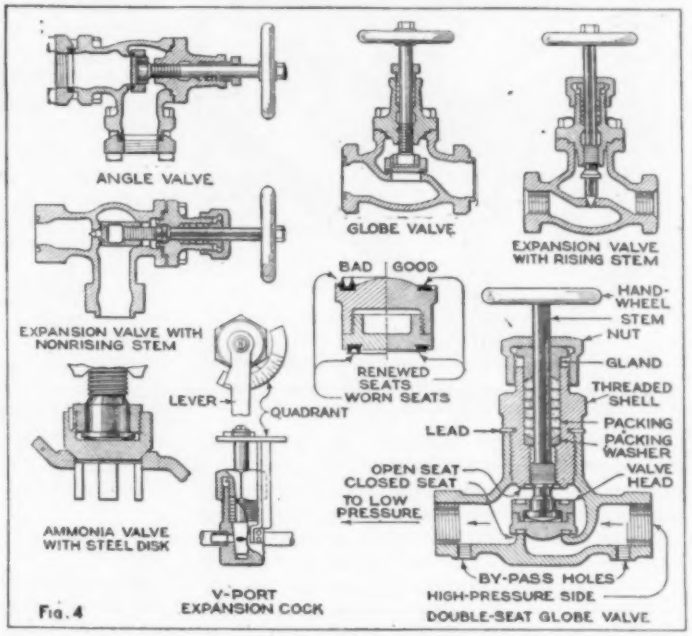
FIG. 3

Diagram of the Pipe Connections: The Arrows Show the Direction of the Gases When Pumping from the Discharge Side to the Suction Side

sary to reseat these valves; to do this, the stems and bonnets must be removed, and the ammonia must be prevented from escaping while the valves are open. To repair valve A, proceed as follows: Close the shut-off valve between the cylinder and condenser, close also valves A and B, and open the cross-by-pass valves C and D; run the machine until the oil trap frosts up well. This pumps the gas from the discharge side, through the by-passes, into the suction side, as shown by the arrows. Close valves C and D, then the bonnet and stem may be removed from valve A.

It will probably be found that the lead seats are spun up, as shown in the center drawing of Fig. 4, which shows a double-seat valve head. To reseat, heat the head with a blowtorch until the lead melts and flows freely in the groove. Add a little new lead, and skim off the oxidized surface lead. If care is exercised, both seats may be renewed without unscrewing the two parts of the head, but the repairman with no experience in this work will probably find it better to unscrew the head and repair each seat separately. When replaced in the valve body, screw tightly in place, and use a monkey wrench on the valve wheel when seating for the first time; this will make a tiny circular impression on the new seat, and it will hold tight. If the valve has a steel disk instead of a soft seat, regrind as instructed for the cylinder valves.

To repair valve B, pump a vacuum on the system, close the line suction valves, and again pump a vacuum. Now close valve A, after stopping the compressor, and the line between the cylinder and the line suction valve will have no gas in it. Open valve E, and dissipate the gas in water as explained before; valve B can then be opened and repaired. When replaced, pump out the entrapped air through the discharge cap and replace the cap before opening valve A. These valves should be repacked when dismantled, and a little oil applied on the stem and threads. Various types of globe, angle, and expansion valves are shown in Fig. 4; with what has been said, no trouble should be experienced in repairing any of these. One thing should be borne in mind, however; when placing valves on a line, always present the bottom of the seat or disk toward the source of the greatest pressure, that is, always have a valve shut against the pressure; if the pressure comes on top of the valve, the stuffing box will be under pressure always, and it will be difficult to keep it from leaking.



Sections of Typical Globe, Angle, and Expansion Valves: The Center View Shows the Head of a Double-Seat Valve

Examine the crankshaft stuffing box and repack, placing the new rings with the gaps staggered, to prevent leakage; it is well to smear the new rings with a little thin graphite grease.

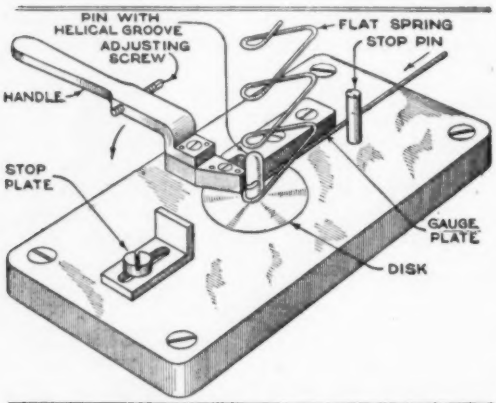
Before starting up an overhauled compressor, pour in a new supply of ice-machine oil, bringing the level up to ½ in. in the gauge glass. Be sure to get the proper kind of oil, as any oil which has not a low freezing point will cause endless trouble.

Another point worth noting is to renew all cotter pins; cotter pins *may* be bent more than once without breaking, but use new ones, and be safe.

Do not turn any valve, or open any part, on an ammonia compressor, without tracing over every part of the system, or without being sure what the effect will be, and also be sure that there is a near and free exit, so that a quick escape may be made if the gas comes out too strongly.

Fixture for Forming Flat Springs

The drawing shows the construction of a fixture for forming flat springs quickly, conveniently, and uniformly. A bedplate,



A Fixture for Conveniently and Quickly Forming Specially Shaped Flat Springs Uniformly

which may be of cast iron, is machined and provided with screw holes at the corner for attachment to bench or table, and a hole is bored out at the center to receive a steel disk, which should be a free-running fit, but without shake. A drive-fitted pin is inserted into the center of the disk. A helical groove, with a pitch equal to that desired in the spring, is cut into this central pin. A gauge plate is fastened to the plate for guiding the wire and for preventing vertical movement of the disk. A sliding, adjustable stop plate is also provided, to make the spring of uniform width. The forming handle is fastened to the disk and should stop against the gauge plate, as shown; as the handle must clear the center pin and stop plate, it should be offset, and provided with an adjusting screw which comes into contact with the stop pin, and serves to keep the coils of the spring parallel.—S. H. Johnson, Westville, Conn.

Efficiency of Wood Fuels

Two pounds of dry wood of any nonresinous species have about as much heating value as a pound of good coal. A ton of coal may be taken as the equivalent in heating value of a cord of heavy wood, 1½ cords of medium-weight wood, or two cords of light wood.

The following is an approximation of the number of cords of seasoned wood of various kinds needed to give the same amount of heat as a ton of coal, on the basis of 80 cu. ft. of wood, with a moisture content of 15 to 20 per cent to the cord: one cord of hickory, hard maple, beech, birch, oak, ash, elm, locust, longleaf pine, and cherry; 1½ cords of shortleaf pine, Douglas fir, western hemlock, sycamore, red gum, and soft maple; and two cords of cedar, cypress, redwood, basswood, poplar, catalpa, spruce, and white pine.

Resin gives twice as much heat as wood, weight for weight. Hence, such woods as the pines and firs have more heating power per ton than nonresinous woods. The resinous woods in the list are considered as having an average amount of 15 per cent of resin.

The fuel value of the wood depends in many cases not alone upon its heating power, but also upon such qualities as easy ignition, rapid burning, freedom from smoke, and uniform heat. As a rule, soft woods burn more readily than hard woods, and light woods more readily than heavy woods. The pines give a quicker, hotter fire, and are consumed in a much shorter time than birch, whereas birch gives a more intense flame than oak. Oak, however, gives a very steady heat.

Case Holds Tags Numerically

An adaptation of the device shown in the drawing can be used to deliver consecutively numbered tags or plates, such as used for marking machinery, automobiles, and the like, and is suitable for the accommodation of plates that are made up and stored in advance of the parts being made.

The holder is made from hardwood with a compartment the exact size of the plates, the lower end of the slot being curved, as shown, so that the plates will move forward and downward as the bottom one is removed. A sliding front that fits into grooves in the sides is removable for replenishing the supply of plates; to prevent tampering with the contents, the holder can be locked.—G. A. Luers, Washington, D. C.

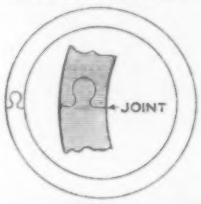
Castings for Six-Inch Bench Lathe

In response to our request, Mr. J. V. Romig, the author of the article on "Making a Six-Inch Bench Lathe," published in our October issue, has kindly consented to furnish the necessary castings for this lathe, to any who contemplate building one. They will, of course, be rough castings, and the price will be nominal; if machined castings are ordered, a higher charge will be made to cover the cost of the work.

Further information may be obtained by writing to the editor of this department.

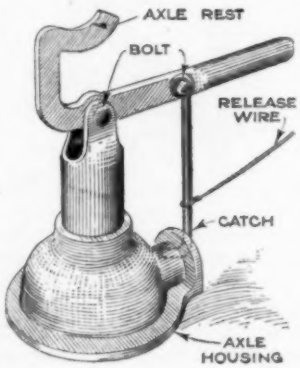
A Gasket Lock Joint

When the pressure-head gasket blew out of the hoisting cylinder of an ash hoist, just at the time of day when it was most needed, a delay of several hours would have been necessary to have removed the piston-rod cables, sheaves, and other parts, to replace a solid gasket. However, by cutting the gasket joint as shown, a non-slipping splice was made, and the job completed in less than half an hour.—U. S. Sprout, Lancaster, Pa.



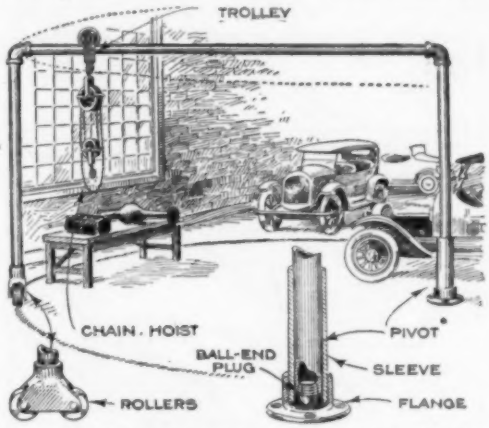
Jack Made from Axle Housing

Jacks around the service station are often "borrowed" without being returned. To avoid the cost of providing jacks for those lost in this manner, one station used jacks of the type shown in the drawing; these were made in their own shop. Sections of the axle housing of light automobiles were used, cutting them as shown and fitting a forged lifting bar and hook, to hold the jack in its raised position. Such jacks are always returned, as they are too large to fit in the tool box or under the seat of an auto.



Radial Shop Crane

A crane suitable for the garage and machine shop, that involves no structural changes in roof or wall beams and requires no separate guides, is constructed, as illustrated, from pipe, making it sufficiently simple and inexpensive for any shop, even though it be used infrequently. A center pivot, consisting of a section of pipe and a closed-end floor flange, supports one end of the crane in the manner shown in the detail. The outer end of the crane is supported upon rollers so that the device can easily be pushed around.



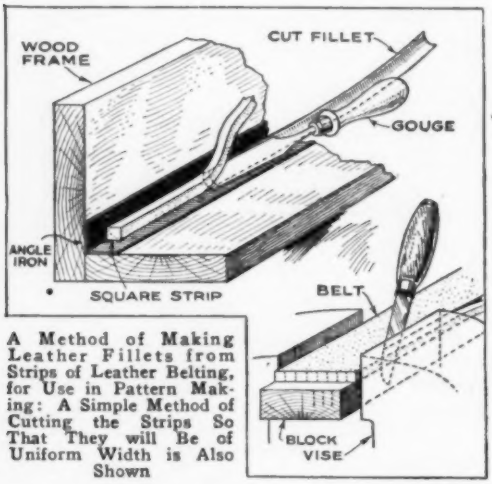
A Radial Shop Crane for the Garage and Machine Shop That can be Pushed to Any Point of Its Circular Path

Brake-Lining Fixture

The usual method of riveting new lining to the brake and transmission bands of automobiles consists in clamping a punch in a vise, to back up the rivet while the head is being upset with the hammer. This requires considerable effort to keep the punch and rivet together. The idea illustrated by the drawing makes the riveting job somewhat simpler and requires nothing more than a large steel ball, placed in the hardy hole of an anvil. The rivet is set on this, and the end hammered over. The first blow makes a small depression in the rivet, and the ball rests in this.

Making Leather Fillets for Wood Patterns

Leather fillets glued into the corners of wooden patterns are often used, and while they may be bought ready-made, it is occasionally necessary that a special size be made in the shop.



A Method of Making Leather Fillets from Strips of Leather Belting, for Use in Pattern Making: A Simple Method of Cutting the Strips So That They will Be of Uniform Width is Also Shown

A good method is to cut an old leather belt into strips of square cross section, in the manner illustrated in the lower part of the drawing. A wooden block, the same width as the belt, is clamped in a vise, the top of the block being lower than the tops of the vise jaws. A knife is then stuck into the block, at a distance from one of the jaws equal to the required width of the strip, and the belt is pulled through, as shown, cutting off one strip. The block is now planed down to the width of the remaining piece of belting and the operation repeated. Thus the strips will be of uniform width.

A form is then made by nailing together two pieces of board at right angles, with a right-angled strip of heavy tin or sheet iron nailed into the corner. One of the square leather strips is placed in the corner and either a gouge pushed along it while holding one end of the strip, or the gouge is held stationary and the leather strip pulled against its edge. If the resulting fillet is a little rough, it may be smoothed by wrapping fine sandpaper around a hardwood dowel and rubbing it along the surface of the leather, still held in the corner of the form; or it may be sandpapered after being glued into the pattern.

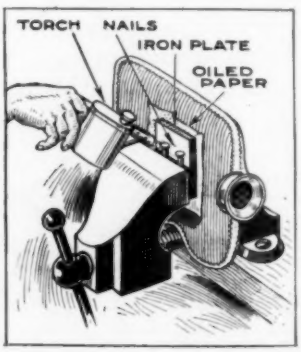
Another way to make such a fillet is to glue the uncut square strip to the pattern and hold it in place temporarily by driving in a series of brads diagonally, allowing the heads to project. When the glue has set, the brads are pulled out, and the strip is cut with the gouge, and sandpapered. If a fillet is glued into place after being cut to shape, it is usual to press it down into position by means of a small rod, with a brass ball on the end, of the same radius as the fillet.—H. H. Parker, Oakland, Calif.

Tap Wrench Aids in Using Breast Drill

When drilling with a breast drill, to overcome the catching of the drill that necessitates backing it up, the following remedy is a good one: Take a tap holder from a set of taps and dies, slip the shank of the drill through the tap holder, and tighten down as when holding a tap. Allow enough of the drill shank to stick through to engage in the drill chuck. The tap holder now acts as a flywheel and the centrifugal motion carries the drill past the little catches unnoticed; the drilling is thus made much easier.—Orin C. Watkins, Salem, Ore.

Vulcanizing without a Vulcanizer

Repairing slits in boots, hot-water bottles, or similar rubber goods that are too large to fit into one of the small gasoline vulcanizers, used for mending punctured automobile tubes, is done with the makeshift vulcanizing apparatus shown in the drawing. The surface around the slit is treated as in patching a tube; that is, it is cleaned with gasoline for a generous distance around the aperture and the surface roughened slightly with sandpaper. A good coat of vulcanizing cement is applied and allowed to dry for a few seconds, and a neat patch of vulcanizing rubber is put in place and smoothed down until it adheres evenly.

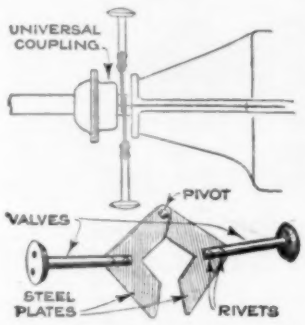


Then, taking two sheets of iron, as near the size of the patch as possible, one is placed against the patch and the other on the opposite side of the article

being mended. A piece of waxed paper is placed between the plate and patch to prevent sticking. The whole is then clamped in a vise, as shown in the drawing, using a couple of nails between the vise jaw and the iron plate, to permit a free play of flame from the alcohol torch used to supply the heat. The flame is kept playing on the plate against the patch, which is kept hot for about 10 minutes, then allowed to cool for another 10 minutes before removing the work for inspection. — Harry W. Poor, Boston, Massachusetts.

Tool for Inserting Auto Universals

The tool shown in the drawing will be found of particular value in automobile garages and service stations making a specialty of light-car repairs; it is used for inserting the end of the universal joint into its socket in the transmission.



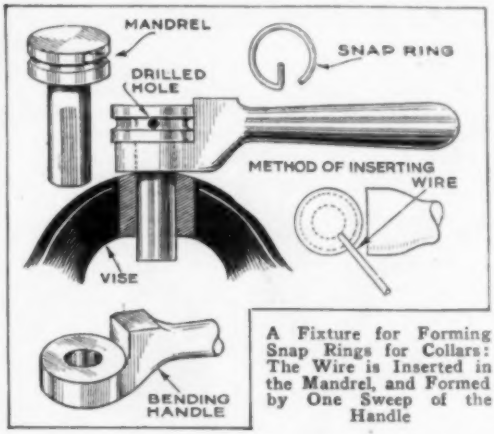
Two sheet-iron plates, triangular in shape, are hinged together at one side, as shown, and a square opening, the size of the universal-joint shaft, is cut in the center. Old valves, welded or riveted to the separate plates, are used for handles. With the tool in position around the universal shaft, the latter can be turned and centered so that it can be inserted into its socket in the transmission.

Motoring through Snow

When driving an automobile through deep snow, it is well to remember that letting some air out of the tires will give a broader traction surface; this is as efficacious in sand as in snow. While tire chains usually are effective, the wheels will sometimes spin; and it is advisable for the winter tourist to carry a pair of mudhooks for such occasions. Do not get alarmed if the radiator boils, so long as it contains enough water to cover the cylinder heads. Snow can be melted for the radiator by placing a bucket full under the radiator drain cock, and allowing some of the hot water to flow into it.

Snap-Ring Bending Fixture

The fixture shown in the drawing may be made in any machine shop at but slight cost, and will be found very useful in forming snap rings for collars used on small shafts, and for various other purposes. A circular mandrel is turned with a grooved collar, and a hole, slightly larger in diameter than the diameter of the wire used, is drilled in the center of the groove. Flats are filed on the mandrel shank to prevent it from turning in the vise.

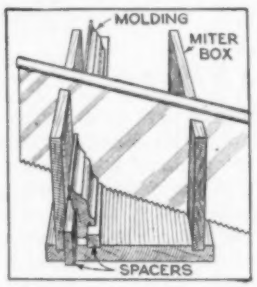


A Fixture for Forming Snap Rings for Collars: The Wire is Inserted in the Mandrel, and Formed by One Sweep of the Handle

A handle, the boss of which is bored to fit freely on the shank of the mandrel, is shaped as illustrated, and the fixture clamped in the vise. The wire, cut to length, is inserted in the hole in the mandrel, and one turn of the handle completes the ring.

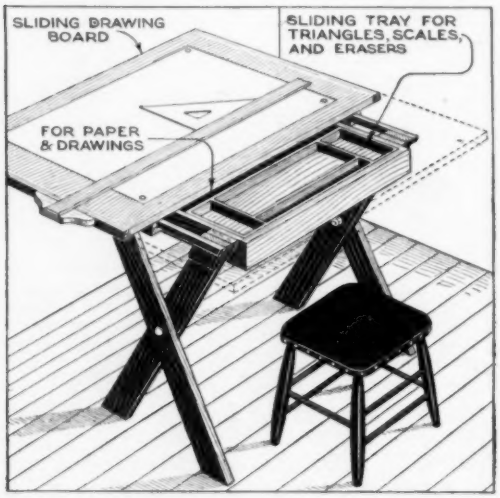
Mitering Odd-Shaped Molding

Cutting molding that has a very narrow back, although full and round in the face, is somewhat difficult because the work rocks and slips on its narrow base. The easiest and surest way of making a correct miter, or joint, is to slip in strips of wood of suitable thickness between the sides of the miter box and the work, to provide a support for the latter, as shown in the drawing. If a great deal of molding of one style is to be cut, these strips can be permanently attached to the miter box.



Novel Arrangement of Drawing-Table Drawer

The illustration shows a novel method of attaching a drawer to a drawing table, in which the drawer, instead of the board, is attached to the legs. The reason for



A Novel Arrangement for a Drawing Table: The Drawer is Fastened to the Legs, and the Drawing Board Moves Back over It

this is, first, that it is not necessary to move back when opening the drawer, and, second, that the drawer, being usually filled with books and paper, is much heavier to move than the top. Furthermore, the board is often tipped up at the back so that the drawer is disposed to slide out, and, as the drawer has considerable depth, the supports are more conveniently attached. A sliding tray is made to receive scales set on edge, so that one may be selected conveniently with a very slight opening of the drawer. The divisions in the sliding tray can be made to meet the requirements of individual cases.—G. M. Beerbower, Tarrytown, N. J.

Soldering Jewelry

It is of first importance that soft solder be avoided as far as possible in repairing articles of gold and silver, and even filled and plated jewelry can be repaired with hard solder. To repair a ring, the shank of which requires soldering, bury the setting in a crucible of wet sand, place a small piece of charcoal against one side, and coat the break, previously cleaned by scraping or filing, with borax; charge with solder and blow a flame against the ring until the solder runs in.

Articles that require protection against discoloring in the process of soldering, should be coated with a mixture of burnt yellow ocher and borax, adding a little gum to make it cover the article completely. Allow it to dry, charge with borax, solder, and boil in a weak pickle composed of nitric or sulphuric acid in water. One important point is to wash the piece well in hot water, with a little ammonia added, to remove any dirt and grease, before undertaking any repairs.

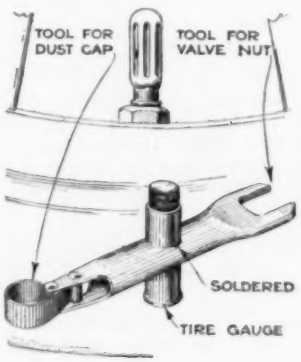
If the article is made of colored gold, boil out in a pickle of muriatic acid and water, but never coat with any protecting mixture. To repair gold-filled work, melted solder is required; this may be made in the proportion of 1 oz. fine silver, and 10 dwt. hard brass wire, to which 2 dwt. of zinc is added just before pouring. Or, for strong silver use only the silver and brass.

For repairing most bright gold work, use an alloy composed of 3 dwt. fine silver, 3 dwt. gold, and 2 dwt. fine copper.

A good solder for soldering spectacle frames or other steel parts is made by melting together equal parts of silver and copper.—Geo. M. Millard, Toronto, Ont.

Tools for Valve Combined with Tire Gauge

A tire gauge, used in an eastern tire-service station, was incorporated into the three-in-one tool illustrated. This tool can be used for gripping the dust cap or valve nut, according to the end used, and is made by drilling a hole through a piece of thin steel tubing and soldering the tire pressure gauge in this hole. One end of the tubing is flattened, and a slot cut to fit around the valve nut. At the opposite end, a strip of sheet brass is riveted to form a toggle that takes a tight hold of the dust cap.



¶ Pure Venetian red is the most durable color known for outside woodwork. If applied with pure linseed oil, it will last as long as the woodwork.

Moving Big Trees Economically

By A. M. HUSTEAD

HAVING obtained a contract for moving several large trees from their original location to another, a landscape-service firm successfully accomplished the work without the use of special apparatus. For the transportation of a 16-in. hard maple, a trench was dug around the tree at a distance of about 4 ft. from the trunk and about 4 ft. deep, or to a depth sufficient to catch most of the surface roots. During the time the tree was being dug loose, it was well guyed to prevent it from falling over. The ball of earth around the roots was allowed to freeze until it could be moved without danger of cracking, or losing the earth from around the roots. When the ball was frozen sufficiently, the tree was tilted back and plank skids placed underneath; then, when the tree was "loaded," it was pulled out of the hole by means of suitable tackle and dragged to its new location by a truck.

The hole into which the tree was transplanted was dug with an incline from the bottom to the surface so that the tree could be slid into position by means of pulleys, cables and a check rope, to prevent a too sudden drop into the hole, as this might cause the ball to crack, with ultimate loss of the tree.

After the tree was in place, the dirt was backfilled, thoroughly tamped, and puddled in with a stream of water. It is of the utmost importance that the earth be well tamped around the ball and that no air pockets be allowed to form, as these are detrimental to root function, and will, therefore, retard the normal growth.

Showing the Method of Trenching around the Tree and the Appearance of the Root Ball: Many of the Feeder Roots are Cut in This Operation, and This Requires a Subsequent Thinning Out of the Branches

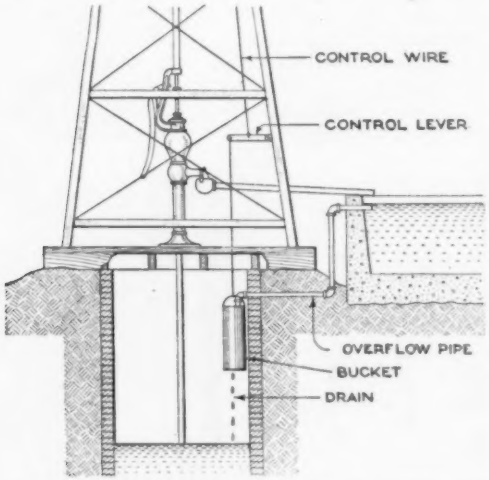
Above, the Tree being Dragged to Its New Location by a Motor Truck: The Root Ball must be Frozen So Solidly as to Avoid Splitting It or Losing Earth around the Roots. Left, Lowering the Tree down an Incline into the New Hole: A Check Rope around the Ball Prevents a Too Sudden Drop

In moving a tree, many of the feeder roots are necessarily cut off, and this will require thinning out the branches. From this particular tree two wagon loads of brush were removed without spoiling its original symmetry.

¶It is well to remember, when round holes are to be accurately sized, that the properly designed round broach has demonstrated its value for this work even in comparison with roughing and finishing reamers. The work is produced at a greater speed and a considerably lessened cost for tool maintenance.

A Simple Windmill Regulator

Many devices have been applied to windmill-driven pumps supplying water to tanks, to regulate automatically the operation of the windmill as the water in the tank becomes too high or too low.



An Automatic Regulator for a Windmill-Operated Pump on the Farm That Keeps the Tank Filled with Water at All Times and Prevents Overflowing

Most of these arrangements are operated by a float or other device in the tank, and are easily rendered inoperative if the float leaks, or the mechanism rusts.

The arrangement shown in the drawing suffers from none of the shortcomings of floats. A 5-gal. cream can is suspended in the well from the end of the control lever by means of a strong wire. A small hole in the bottom of the bucket allows the water to drip out so that it is emptied about every three hours. As the weight is released, the pump clutch is automatically thrown in, and water is pumped into the tank until it reaches the level of the overflow pipe, which drains into the bucket; as the bucket is filled with water the pump is automatically disengaged, so that the container is prevented from overflowing.—S. E. Gibbs, Corydon, Ia.

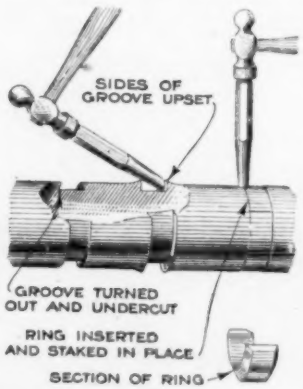
Deodorizing the Glue Pot

Quite often the glue pot exudes an odor that is almost unbearable; this is often caused by bad glue, but more frequently by the brush. Copper-bound brushes are the most desirable, and, when quitting work for the day, they should be taken out of the pot and hung up until the next morning. Only a few minutes are required to soften up the brush, and when treated in this fashion, all or most of the disagreeable odor will disappear. While in no way affecting the adhesive qualities of the glue, a few drops of some oil, like oil of sassafras, clove, wintergreen, or cinnamon in the glue pot, is very effective in purifying the vapor arising from the glue.

Repairing Grooves Worn in Shaft

When a ring-oiling box is found that continues to give trouble from heating, it is generally because one of the rings has stopped turning at some time and worn a groove around the shaft; this groove prevents the oil brought up by the ring from being properly distributed, and, of course, the bearing will not be lubricated. These grooves are not usually noticed until the machine is taken down for repairs of some sort, as they are not noticeable so long as the machine is in operation. If the box is oiled by hand, it will run properly, but if the rings are depended upon to carry the oil, the bearing cannot help but run hot.

When grooves are found in a shaft, particularly if the bearing is an important one, it is essential that they be repaired. Sometimes a new shaft may be put in, but to do this, the machine will often be shut down when it is most needed. Also, the shaft may be turned down small enough to eliminate the grooves, but this makes a new bearing necessary, which is impossible in case the bearing is solid and a gear or pulley goes on the end outside the bearing.

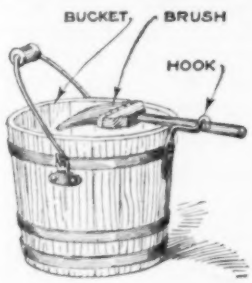


Another method to bring the shaft back to its original condition in a short time is illustrated by the drawing. The grooves are squared out and slightly undercut, and a small punch is then used to bring the sides of the groove parallel by upsetting the metal above the surface of the shaft. A metal ring is turned up with beveled sides to fit into the dovetail groove in the shaft. The ring is sawed in half and the sections placed in the groove, the metal that was upset being staked

back in place to hold the ring securely to the shaft. If this operation is done carefully, the shaft will be the same size as before, and the ring can be turned to the exact diameter of the shaft, making it difficult to tell where the ring was applied. Small shims can be inserted to compensate for the metal removed when the ring was sawed. On very small shafts the ring can be held in place with solder, but this does not work so well on larger pieces.—James Ellis, Memphis, Tenn.

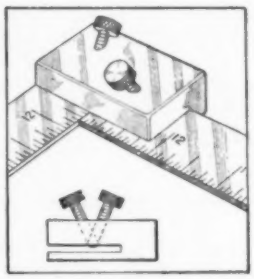
Calciminer's Brush Holder

A holder, permanently attached to the calcimine pail in such a manner that the brush may drip into the vessel, will prove of convenience to the workman. A hook is formed, as illustrated, from a piece of round iron, flattened at one end and attached to the bucket with screws, if a wooden bucket is used, or with rivets, if a metal one. The handle of the brush rests on the rim of the pail and under the hook, where it may be instantly disengaged.—Jesse L. Blickenstaff, N. Manchester, Ind.



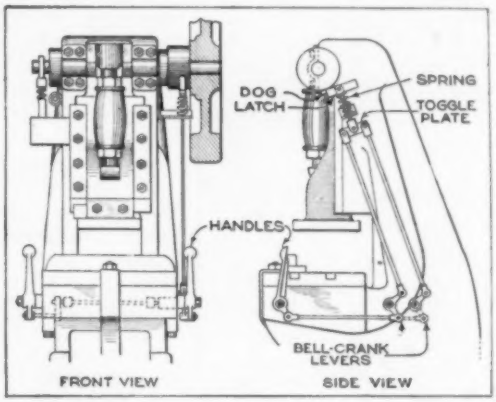
Making a Square from Scales

The drawing shows a convenient little clamp attachment whereby two ordinary machinist's steel scales can be converted into a square, or attached end to end to form a single long scale. The clamp is made from a block of flat steel, slotted to the desired depth to take the scales. The ends of the thumbscrews are turned to a conical point of such an angle that the conical surface is parallel with the face of the scale. It will be seen that with the screws in this position, the action of tightening them rolls the edges of the scales together automatically. Both screws have right-hand threads and knurled heads.



Safety Device for Punch Presses

A manufacturer has designed and installed on his punch presses a safety device that forces the operator to use both hands to trip the press, thus making sure that the employe's hands will not be under the ram when it descends.



A Safety Tripping Device for Punch Presses, the Operation of Which Requires Both Hands, So That They cannot be Caught under the Descending Ram

The drawing shows the operating principle of the arrangement. A toggle plate, the center of which is connected to the tripping latch of the press, is controlled by rods hinged to each end. To cause the tripping lever to operate, both rods must move downward at the same time; if only one is moved, the toggle plate will turn about its center and impart no motion to the tripping latch.

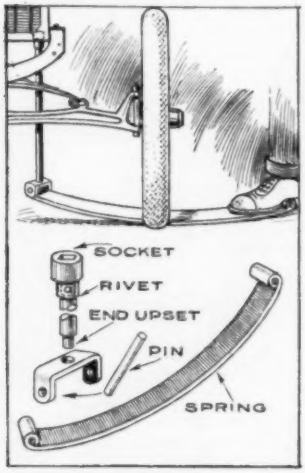
Two cast-aluminum handles, one on each side of the press, are pivoted on studs screwed into the press bed. The motion of the handles is transmitted to the toggle plate by ¼-in. cold-rolled steel rods and bell-crank levers. The handle at the left-hand side transmits its motion to the toggle through a ⅝-in. cold-rolled steel shaft extending from the left to the right side of the press. Slots are cut in the toggle plate where the connecting rods are attached, so that the operator will have to push both handles far enough to trip the latch.

This type of safety tripping device is considered more satisfactory than the air-operated device, as its action does not depend upon the use of air pressure, or any other agency but the control of the operator.—Edward H. Tingley, Dayton, Ohio.

¶ Overprinted blueprints can be bleached by flowing very hot water over them.

Holder for Crankcase Bolts

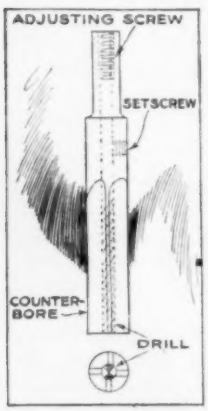
An improvised spring holder, that facilitates the removal or insertion of the crankcase bolts on certain types of automobiles, is shown in the drawing. With such a tool, the bolt is prevented from turning, while both hands are free to place the nuts and washers in position and screw them down. There is nothing complicated about the device, which consists of a wrench socket, of a size to hold the bolts, fastened to one end of an iron rod, which is hinged at its opposite end to an old auto-spring leaf.



In use, the end of the spring is held down with the foot, and this holds the wrench over the bolt head until the nut has been screwed down from above.

Counterbore for Square-Bottom Hole

The drawing shows a counterbore that was designed to make a flat-bottom hole in a case where a teat projecting from the bottom of the hole, as left by the ordinary flat-end drill, was not permissible. Usually, with a tool of this character, considerable trouble is encountered in keeping it sharpened, when it is made in one piece, as there is no clearance at the center. In the tool illustrated, a hole is drilled axially to accommodate a small drill, held in place by a setscrew, the thrust and compensation for wear on the drill being cared for by the adjusting screw in the top. It is no great trick to grind a drill to cut a square bottom, and the clearance necessary to grind the body is provided by the axial hole.—John Homewood, Ontario, Calif.

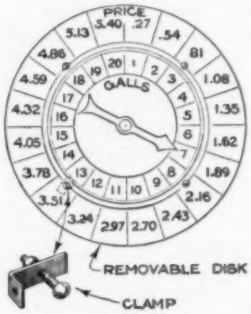


Speed of Conveyor Belts

The National Safety Council recommends the following speeds for belts conveying loose material, such as grain or sand: for belts under 16 in. wide, a maximum speed of 300 ft. per minute, while 450 ft. per minute should be allowed for belts of from 16 to 24 in. in width. For belts wider than 24 in., a speed of 600 ft. per minute is permissible. Belts carrying packages are generally run no faster than 60 to 100 ft. per minute.

Price and Quantity Dial Calculates Cost of Fuel to Motorists

A garage proprietor selling gasoline to motorists has installed the calculator shown in the drawing on his gasoline-measuring pump, saving his own time and that of his customers.



The dial is made from a piece of tin of suitable diameter, in this instance about 8 in., with a pointer at the center. The disk is divided off into the proper number of segments, as illustrated. The price for one or more gallons of fuel is indicated on the outer circle; the number of gallons is shown on the inner one. Of course, any changes in the retail price of the fuel will make it necessary to alter the figures on the outer circle to conform to the new price. Where prices are subject to frequent changes, cardboard circles can be lettered and applied to the sheet-metal disk with shellac. The device is attached to the measuring pump with small bolts and clamps similar to the one shown.—F. J. McMillan, Morristown, Ohio.

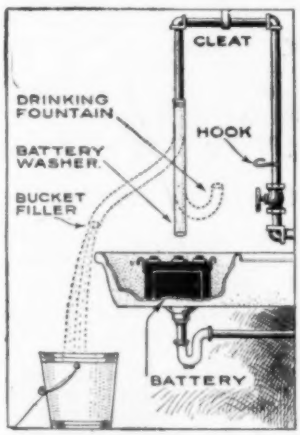
Machining and Finishing Ebonite

Ebonite, which is sometimes called vulcanite and hard rubber, and which is largely used for electrical purposes, is also of great use in the chemical industry, owing to the resistance it offers to chemical reagents. It is stable toward air, light, and changes in temperature up to about 175° F. It can be softened in boiling water and then bent and shaped as desired; the shape or impression is re-

tained on cooling, but if the material is subsequently softened by heat it will return to its original form. In machining it, the tool must be sharp, and to prevent overheating, the cut must not be too heavy. If the tool and the work are not kept cool, the former will rapidly lose its edge and the work will be burnt. In polishing ebonite, the surface should first be rubbed smooth with powdered pumice and then buffed, using a tripoli compound, and running the cloth polishing wheel at high speed, the work being held lightly against the wheel. In making ebonite, sheet-metal foils are used as a backing for the plastic material during the process of vulcanization, and this gives the finished sheets their well-known glazed appearance. Owing to the fact that this surface is slightly metallic it should be removed when the material is used for electrical work, else the insulation will be low, owing to surface leakage.

Battery Service-Station Aid

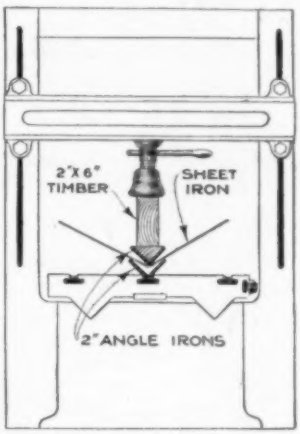
The arrangement shown in the drawing is one of the labor-saving features of a well-planned storage-battery service station. The valve is fitted close to the wall, and from it the water-supply pipe is run overhead to a point about the center of the sink. A short vertical piece of pipe has a length of rubber hose attached to it, as in the illustration. When washing out battery cells, the hose can be swung to any angle. Other conveniences of this arrangement are that the hose can be used as a drinking fountain, or to fill buckets, as indicated by the dotted lines.



¶To remove a bolt that is "set" or "frozen," or that one has reason to believe cannot be driven out, use as large a wrench as can be handled and tighten down the nut, even if it twists off. This will stretch the bolt and reduce its diameter slightly so that it can be driven out with comparative ease.

Bending Large Sheets of Metal

In a case where several large galvanized-iron tanks were to be made, they were so large that two full-sized sheets of metal were required for the sides and bottom. These pieces had to be bent at right angles for their entire length and the ends riveted together on the bottom. The problem was to bend these sheets to leave a square corner. To start at one end and bend as the work went along was first tried, but it was found that the metal stretched and warped, so that this method would not answer. The planer was then rigged up as an angle press, and the results were perfect.



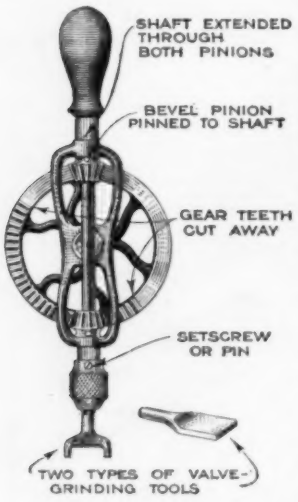
Two pieces of 2-in. angle iron were cut to the length of the sheet metal. One length was placed in the T-slot of the planer table and the stock laid on this. A triangular piece of wood was nailed to a 2 by 6-in. timber, 6 ft. long; this was placed on the second angle-iron strip, and a screwjack fitted between it and the crossrail of the machine. By turning the jackscrew, the sheet of metal was bent for its entire length in one operation, and no kinks were formed.—Edwin J. Bachman, Fullerton, Pa.

Drilling Tile

A contractor discovered that one of his men was drilling holes in tile bathroom fixtures about four times as fast as the other workers. Asked to explain his method, the worker demonstrated how cut nails were used in place of the ordinary twist drill. He filed the heads of two nails so that the nails would lie close together, and put them into his brace as he would a drill. He started the hole with the point of a screwdriver, or similar tool, and then applied the nails, which penetrated into the tile much faster and with less loss than the twist drill. When the nails become dull, they are thrown away and a new pair inserted.—Armstrong Perry, New York City.

Valve Grinder Made from Hand Drill

If an old hand drill, or breast drill, of the type in which the spindle runs up through both bevel pinions and into the handle, can be obtained, it may be converted into a tool suitable for valve grinding. The gears are removed and the upper pinion pinned to the spindle. Then, over half of the teeth on the bevel gear are filed or ground off down to the root depth; a smooth surface should be left even with the roots of the teeth to bear against the upper pinion. Enough gear teeth must be removed to prevent interference of one pinion with the other; that is, they must clear one pinion before starting to mesh with the other. As the spindle will now continually reverse its motion as the operating handle is turned, the drill chuck is likely to loosen, so it must be pinned or setscrewed, or removed altogether, and the valve-grinding tool be fastened directly to the end of the spindle.


SHAFT EXTENDED THROUGH BOTH PINIONS
BEVEL PINION PINNED TO SHAFT
GEAR TEETH CUT AWAY
SETSCREW OR PIN
TWO TYPES OF VALVE-GRINDING TOOLS

Using Wood Alcohol

Great caution should be observed in the use of any mixtures containing wood alcohol. This is the most deadly poison used in daily commerce; one teaspoonful has been known to cause blindness, and one ounce, death. The poison may be absorbed into the body through the nose, mouth, or skin, so that even the inhalation of the fumes, or the contact of the liquid with the hands, or any other part of the body, may cause poisoning just as though the alcohol were taken into the system through the mouth.

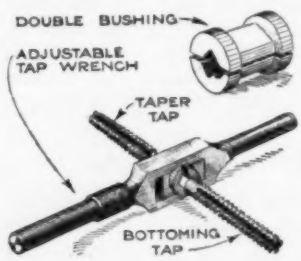
Sudden blindness, with vomiting and abdominal pain, should always cause suspicion of wood-alcohol poisoning, and no time should be lost in having the patient treated by a physician.

Denatured alcohol should be substituted for wood alcohol wherever possible, as this has no ill effect on the system.

It has been suggested that, in establishments using quantities of wood alcohol, the word "methanol" be used to label the liquid, as this describes the product specifically, while removing the tempting suggestiveness of the word "alcohol." This term, of course, should be accompanied by the word "Poison," as, even though the temptation to drink the liquid might be removed, the danger from absorption and inhalation would still be present.

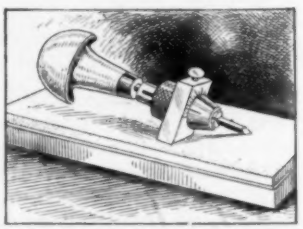
One Wrench for Two Taps

By using a supplementary double bushing, of the type shown in the drawing, and placing this in a standard tap wrench with an adjustable handle, two taps can be accommodated at one time. This is a very handy arrangement when a hole is to be rough and finish-tapped. By using the taper tap to rough out the hole, it is only necessary to reverse the tool to complete the hole, using the bottoming tap. The bushing or holder can be made of any good grade of steel.



Gauge for Sharpening Gravers

It is a very difficult matter for users of gravers, such as those used in engraving metals, to get the correct cutting angle when sharpening them on an oilstone. This is so because the tool must be held at just the right angle, and not be allowed to rock. To overcome this difficulty, and, at the same time, make it possible to sharpen the tool at any desired angle, the tool shown in the drawing was made from a T-handle tap wrench. The handle was cut off, and a hole, large enough to accommodate the gravers, drilled along the axis of the wrench shank. A guide, made of steel, 1 in. square by ¼ in. thick, and beveled on one edge at the proper clearance angle for the gravers, was bored out to fit over

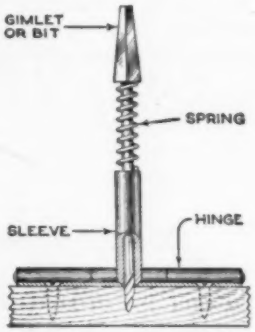


the nose of the chuck, to which it is held by a small thumbscrew, the chuck being first turned down parallel at the place where the guide fits. A zero line was scribed on the nose of the chuck, and the face of the guide graduated in degrees, as indicated.

In use, it is unnecessary to remove the graver from its handle, the tool being inserted through the hole in the center of the one-time tap wrench. The angle of the side faces of the cutting edge can be varied by loosening the thumbscrew on the guide and changing the position of the chuck with reference to the graduations on the block.—Charles E. Stark, North Attleboro, Mass.

Accurate Holes for Hinge Screws

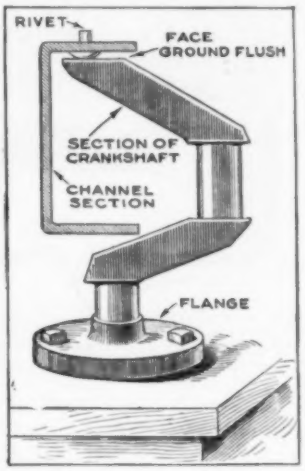
In fastening a hinge to a door, or box, it is first necessary to drill small holes in the wood for the screws. The hinge is placed in the proper position and held there while one hole is marked off with a pencil. The hinge is then removed and the hole drilled, after which the hinge is replaced and a screw driven to hold it in place while the remaining holes are drilled, using the hinge as a template. In order to make this work a little more accurate, the device shown in the drawing was designed. It consists of an ordinary square-shank gimlet, or drill, of the proper diameter, with a spring sleeve on the outside. The sleeve is beveled at the lower end to the same angle as the countersink in the screwholes. Between the drill shank and sleeve, a spiral spring is placed; the pressure of this spring keeps the sleeve always in contact with the work so that the drilled hole is accurately centered.—Charles Homewood, Ontario, Calif.



¶An open flame should never be used for the purpose of discovering leaks in acetylene tanks. Leaks can generally be detected by the odor of the gas, and their location can be determined by applying soapy water to the surface of the tank, and watching for the bubbles formed by the escaping gas.

A Handy Riveting Anvil

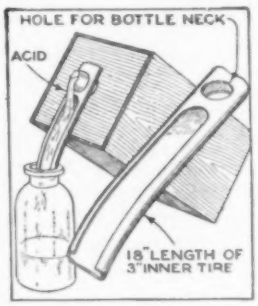
Many riveting jobs require the work to be placed on an offset, to accommodate parts of the work while the rivets are being set, and this is particularly the case on channel iron and work of similar section.



An old automobile crankshaft can be utilized to make a very convenient anvil of this character, as indicated in the drawing, with very little trouble. The shaft is cut off between two crankpins and the cut face ground, or otherwise smoothed off, to provide a plane surface. The section is bolted to a suitable support by means of screws, or bolts, through the flywheel flange. An anvil of this type will prove a useful fixture in the garage for such work as relining brakes, repairing lamp casings, and other work where an opening under the face of the anvil is required.

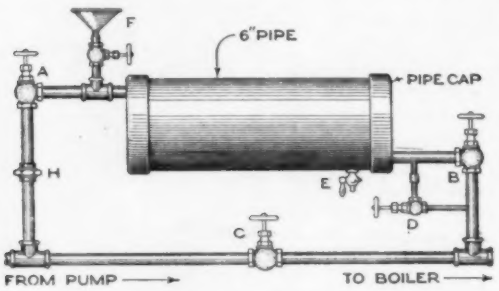
Rubber Trough for Acid Carboys

Acid carboys are bulky and difficult to handle unless they are mounted on some form of pouring device. If no device of this character is available, it is a very difficult matter to pour acid without more or less splashing and spilling, with resulting damage to clothing and surrounding objects. By using a suitable length of automobile inner tube as a trough to guide the acid, all the potential loss and damage can be prevented. A hole is cut into one end of the tube section to fit over the neck of the carboy, and the upper wall is cut away as shown, leaving the sides to guide the fluid into the receiving container.



Boiler-Compound Feeder

The steam boiler-compound feeder illustrated has features not possessed by the usual arrangement. A piece of large-



An Arrangement for Feeding Boiler-Compound Solutions into Steam Boilers with the Feed Water: The Supply of Compound can be Forced in as Fast or Slow as Desired by Proper Manipulation of the Valves

diameter pipe, closed at the ends with caps or flanges, is used as a receptacle for the solution. By opening the valves A and B and closing C, the pump discharge will be forced into the boiler, carrying the compound solution along with it. By leaving A and C open, B closed, and the ⅛-in. valve D slightly open, a slow feed of compound will be secured. It is nearly impossible to get a slow feed by leaving the valves A and B slightly opened. The tank can be emptied of water through the draincock E and filled with the compound through the valve F, the upper end of which is fitted with a funnel. Some engineers may prefer to have the union H located between the tank and valve B; a small union or right and left-hand coupling is used to connect the ⅛-in. pipes. The addition of a glass indicator on the tank, while not necessary, would be an improvement.

Hardened Hasp Staple Prevents Sawing

The staple of an ordinary padlock hasp is made of soft steel or iron, and it is usually an easy matter to saw it off and release the hasp; less trouble than to pry off the hasp or saw the lock. A way to prevent this is to make a special staple of drill rod, hardened and tempered, or of casehardened soft steel. If one is unfamiliar with casehardening, the use of drill rod is preferable, as this need only to be heated, quenched, and the temper drawn. The length of rod, which should be of the largest diameter that will pass through the slot in the hasp, is annealed, and each end is threaded. Old dies should be used if possible, as drill rod is hard on new ones; the S. A. E. thread, as used by automobile repairmen, is preferable to the U. S. S., as less metal is removed.

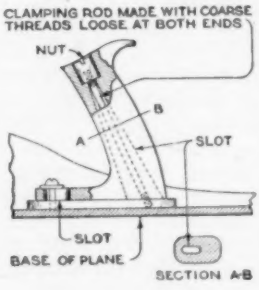
Then the rod is bent to form the staple, heated bright red, and plunged into water. After testing for hardness with an old file, the piece is brightened up with emery cloth and again heated until the polished surface turns to a deep blue, when it is again plunged into water. If tempered correctly, the staple will be too hard to saw easily, but not hard enough to be brittle. After pushing the arms through the staple plate, nuts are screwed onto the ends and these are sunk into the wood beneath the plate.

Eyelets in Draftsman's Triangle

The draftsman's triangle can be arranged so that it is raised out of contact with the paper at each corner, thereby lessening the chance of blurred lines. A hole is drilled through the triangle at each corner; shoe eyelets, which can be obtained from any shoe repairer, are inserted in the holes, and heads are formed upon them. The short legs will keep the instrument from contact with the paper, but do not interfere in any way with its regular use.—C. B. Smith, Chicago, Ill.

Plane Handle Made Adjustable

The plane handle illustrated is made so that it can be pushed toward the adjusting nut to meet the requirements of different users. Ordinarily, the position of the handle with relation to the adjusting nut is such that it can be conveniently reached by only a few persons.



A tapered slot is cut into the handle, as indicated in the drawing. The clamping rod is made with a coarse thread at each end, and makes a loose fit in the nut and bottom of the plane. This makes possible an adjustment of the handle forward for the particular convenience of short-fingered users, or backward for the user whose fingers are long. The adjustment is made by loosening the nut, moving the handle the required distance in either direction, and retightening the nut.—M. E. Duggan, Kenosha, Wis.

Amateur Mechanics
Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

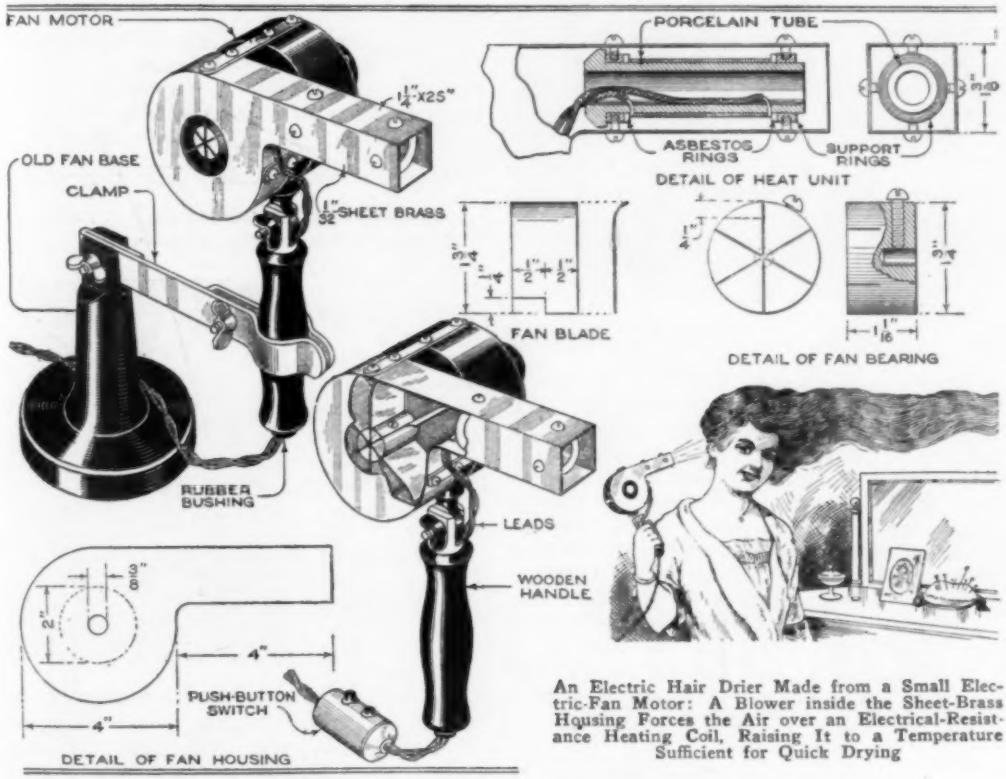
How to Make an Electric Hair Drier

By A. H. SCOTT

THE only parts of the electric hair drier illustrated that require to be made, are the blower and heating unit over which the air is driven to raise it to a temperature high enough for speedy drying.

Two pieces of sheet brass, as illustrated, will be required for the sides of the fan housing, as well as a strip of the same material to form the top and bottom. The fan hub, or bearing, is made from a piece of round brass or iron, slotted across one end to accommodate the six brass blades. The blades are soldered into the slots, and, although supported for only half their width, as shown, are sufficiently rigid to stand without additional support. The combination blower and heater is held to the electric motor by strips screwed to the blower and to the motor shell.

To make the heating unit, obtain a porcelain insulating tube such as used in ordinary house wiring, with an outside diameter of 1 in. This tube is cut off 3½ in. from the shoulder end, and used as a core for 32 turns of .025-in. German-silver resistance wire. Wind the wire tightly so that there will be a space of 1/32 to 1/16 in. between turns, to prevent



An Electric Hair Drier Made from a Small Electric-Fan Motor: A Blower inside the Sheet-Brass Housing Forces the Air over an Electrical-Resistance Heating Coil, Raising It to a Temperature Sufficient for Quick Drying

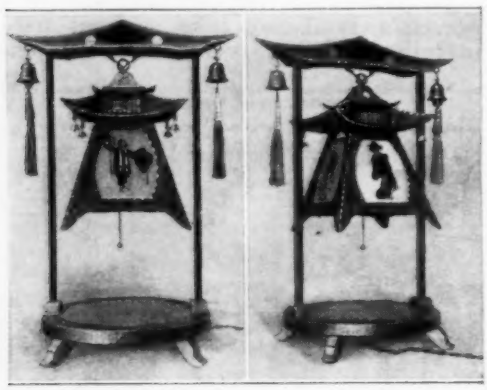
short-circuiting. The ends of the first and last turns should be passed through ⅛-in. holes drilled through the tube. When drilling the tube, it should be plugged with wood and held in a vise, the jaws of which are protected with wood; an ordinary twist drill is used. The leads connecting the heating unit to the circuit must be asbestos-covered.

The heating unit should be centered out of contact with the blower housing. This is done with two brass rings, one at each end of the tube, cut from 1-in. brass pipe. These rings should fit snugly over the ends of the porcelain tube and be insulated from the winding by asbestos washers. The rings are tapped at opposite sides to receive four machine screws.

When assembling the blower, care should be taken to avoid projecting screws that would catch the blades. The finished drier can be provided with a wooden handle, and this can be clamped to an iron base in the manner illustrated, so that it can be used either in the hand or upon a table.

A Japanese Table Lamp

The photograph shows a handsome Japanese-style table lamp, the principal parts of which, with the exception of the



A Neat and Attractive Table Lamp Made in Oriental Style: The Principal Parts are Made of Sheet Metal

base, are made of sheet metal. The panels in the lamp shade are painted, in Oriental style, on opal glass, using transparent colors. The entire frame is painted and covered with sand while the paint is still wet, and the edges are touched up lightly with gold. The shade is wired for an electric lamp, the wires being conducted through the tubular supports and underneath the base; this is made of wood, and is supported above the table on short feet. The completed work can be decorated with small bells and tassels, as in the picture, to increase the Oriental effect. —Louis Beegle, Los Angeles, Calif.

An Advertising Novelty

A novelty in window advertising, that will draw crowds, is very cheaply and easily made from a toy balloon.

The balloon, partly inflated, is fastened over an electric-light bulb in such a manner that air cannot escape at the point of connection. A make-and-break socket, or some other means of opening and closing the circuit intermittently, is provided. When the current is turned on, the light transmitted through the thin rubber balloon will attract attention, and the heat from the bulb will cause the confined air to expand and distend the balloon. As soon as the circuit is opened and the light goes off, the air inside the sphere begins to contract and the balloon grows smaller. An advertising message can be painted on the balloon if desired.—Frederick C. Davis, St. Joseph, Mo.

Yoke Prevents Turkey from Straying

An Ohio farmer, whose turkey hen was continually wandering off with the young poults, devised the board yoke shown in the picture, which keeps the fowl from flying over or crawling through wire fences.

A board, about 6 in. wide and 18 in. long, of the lightest wood obtainable, was tied over the turkey's shoulders, an opening being cut in one edge of the board to conform to the outline of the back. The yoke was fastened to the bird by cords passing under the wings and across the breast.—C. M. Baker, Wooster, Ohio.

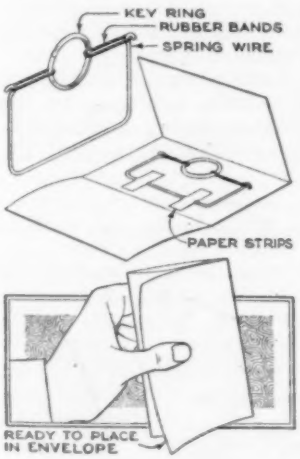
¶A section of old inner tube, with one end cemented shut, makes a handy water pail for the motorist.

Antirattler for Windows

The flat-steel hair curlers that have taken the place of the familiar curling papers can be used to prevent a window from rattling. The curler is flattened out at the point where it is bent, and the resulting spring wedge is inserted between the window sash and frame.—Frank Jablecnik, Chicago, Ill.

A Trick "Letter"

Endless amusement will be obtained from the simple device illustrated, which is attached to an ordinary sheet of letter paper, folded up and placed in an envelope. On opening the supposed "letter," the recipient gets something of a surprise when the ring revolves rapidly.



A U-shaped piece of spring wire is fastened to the paper by paper strips. An iron washer, or ring of the type shown, is held across the open part of the "U" by rubber bands. In use, the rubber bands are twisted so that as soon as the letter is opened they begin to untwist and the ring to revolve, causing it to whiz and whir as though there were something very much alive in the letter.

Using Broken Drain Tile

An outdoor stove can be made from a section of tile, for use in cooking feed, heating water, melting tar, and similar operations. A sheet-iron top, with a hole cut in it to accommodate a length of stovepipe, is provided to support the vessels. An opening in the form of an inverted "U" is chipped in the tile, at a point near the bottom edge, for the insertion of fuel.

The breakage of a small section from the flange of large-diameter sewer tiles makes them unsuitable for use in drainage systems, and they can easily be obtained by anyone wishing to use them.

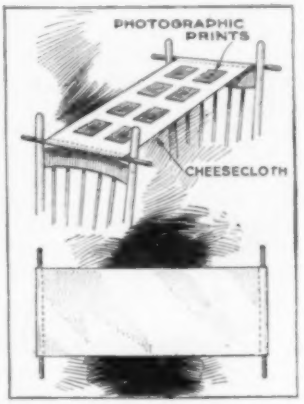
Exhaust Cleans Down Spout

It happens frequently that birds' nests, leaves, and other débris collect in the eaves troughs and wash down into the conductor pipe. During a heavy rain the pipe may be so thoroughly clogged that a free flow of water to the cistern or drain is impossible.

As such obstructions are generally not accessible without a great deal of difficulty, the exhaust from an automobile engine can be used, with good results, to blow out the accumulated débris. The drawing shows how this is accomplished by connecting the rain spout to the exhaust pipe of the car with a piece of hose. By racing the engine, there will be sufficient pressure to eject all ordinary obstructions through the eaves-trough opening.—G. E. Hendrickson, Argyle, Wis.

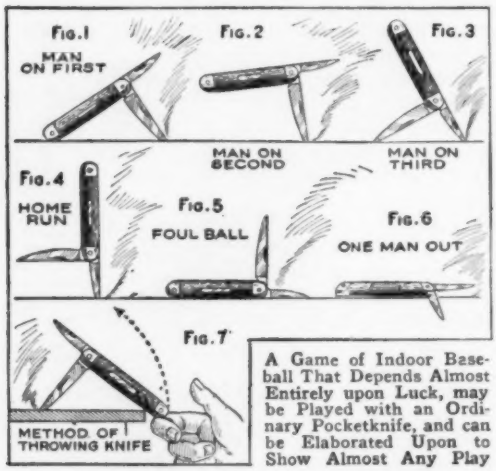
A Print-Drying Stretcher

The commonest method of drying prints consists in the use of a cloth-covered stretcher on which the prints are placed face downward; as cheesecloth is used, there is more or less circulation of air on both sides of the print, which consequently dries very quickly and without the tendency to curl. As generally built, wooden frames are made and covered with cheesecloth, but these occupy considerable room. However, if a strip of cloth, of the length desired, is hemmed at the ends and pieces of broom handle inserted, as indicated in the drawing, the stretcher can be supported between two chairs, and rolled up into a compact bundle when not in use.—Harry G. Schultz, Teaneck, N. J.



Indoor Baseball with a Penknife

A game of indoor baseball that depends for results more on pure luck than on skill, can be played with an ordinary



A Game of Indoor Baseball That Depends Almost Entirely upon Luck, may be Played with an Ordinary Pocketknife, and can be Elaborated Upon to Show Almost Any Play

pocketknife having two blades that can be opened at right angles to each other.

The game is played on a board, or on an old table. Fig. 1 shows the position of the knife that gives the player a man on first base; when the handle is not touching the surface, as in Fig. 2, the player is on second, while to have a man on third, the weight of the knife must be resting on both blades, as in Fig. 3. A home run is scored for the player when the knife stands vertically as in Fig. 4, and the positions of the knife for a foul and a man out are shown in Figs. 6 and 7.

In playing the game, the knife is rested on the surface of the table in the manner shown in Fig. 7 and given a quick upward flip with the hand. Various other plays may be improvised with little trouble by the baseball devotee, so that the game can be made really elaborate.—W. S. Morton, Pasadena, Calif.

Incubator Used as Oats Sprouter

The value of sprouted oats as a green food for poultry has long been recognized, but the difficulty of obtaining or constructing an efficient sprouter has prevented many spare-time poultrymen from making use of the knowledge.

Any poultryman who owns an incubator that is not working during the winter months has at his command an efficient device for sprouting oats. The drawers are removed and extra strips are temporarily tacked to the sides of the incubator, on which the trays containing the oats are placed. The trays are single wooden frames covered on one side with screen wire or burlap. About an inch of space is allowed between each tray to permit a free circulation of warm air.

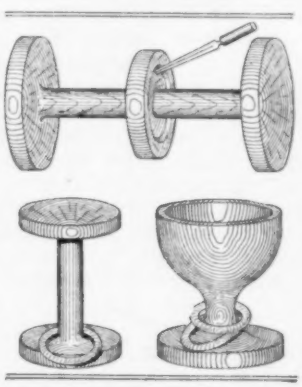
The oats are moistened and placed in the trays and the incubator lamp is lighted and adjusted to maintain a temperature of about 75° F. To prevent the oats from drying out, pans of water should be placed on the floor of the incubator and the grain sprinkled each day.

If the various trays are filled at intervals of a day or so, the poultryman will have a constant supply of green food for his flock.

In placing the additional strips that are necessary for supporting the trays, very small brads or nails should be used, as there will be very little weight upon the strips, and their removal will not then be so likely to mar the appearance of the incubator.

Novelty Wood Turning

Specimens of wood turning containing rings that cannot be removed because they are smaller than the ends of the article to which they are attached, are turned out quite easily on the wood-turning lathe, the illustrations showing two examples of this class of work.



The first operation is to turn the work to the desired shape, as shown, leaving a disk on the spindle. Next, sand and polish the disk as though it were to remain there, and when this is done the ring can be cut from the disk in the manner illustrated. This is best done with a sharp-pointed tool, held at about the angle indicated in the drawing, cutting very slowly. When the ring is loose, the lathe must be stopped and the inner side smoothed with a file. The ring can be tied to the spindle where it will be out of the way, and one or more smaller rings can be turned off in the same manner, if so desired, or the remainder of the disk turned off flush with the spindle.—Victor Carl, Steubenville, Ohio.

UTILIZING NEW STEEL TRENCH HELMETS

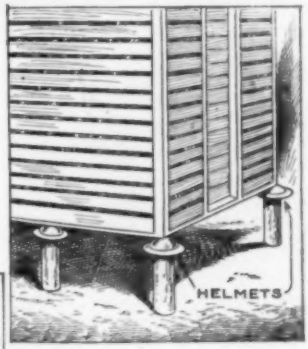
Fruit Dish, Poultry Nest, and Umbrella Stand Made from Helmets

The three ideas illustrated in the large drawing, the fruit dish, poultry nest, and umbrella stand, were submitted by J. V. Romig, of Allentown, Pa.

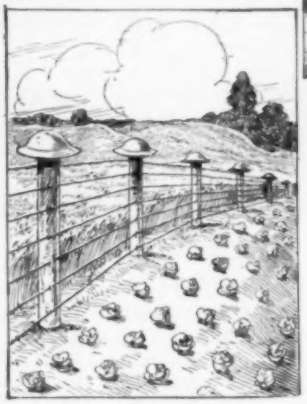
The fruit dish is supported on feet, about 1½ in. long, turned from brass rod. These feet are inserted into holes drilled through the helmet, and riveted, the finished article being decorated in any desired manner, and then lacquered.

Parasites that infest wooden nest boxes refuse to have anything to do with metal nests. Consequently, by mounting trench helmets in the manner shown, the general condition of the flock will be improved. The steel nests are indestructible, and, having no corners or crevices, easily cleaned.

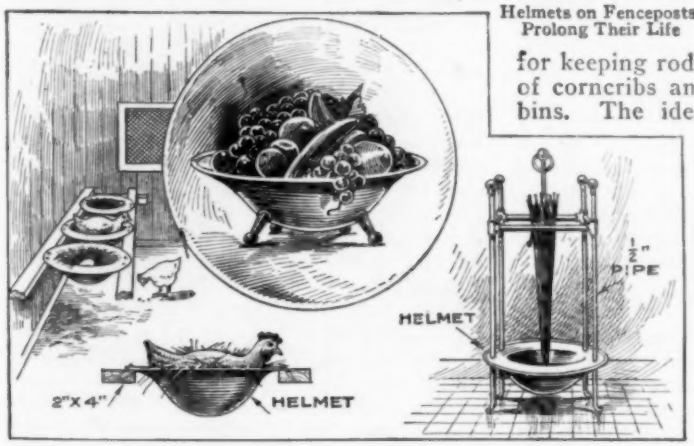
A trench helmet will make an admirable drip bowl for an umbrella stand. The frame is made from ½-in. pipe and fittings, of polished brass, nickeled brass, copper, or painted iron. Holes are drilled in the rim of the helmet to slip over the pipe standards, where it is held in place with cotter pins. The small hole in the center of the crown may be plugged, so that, by removing the plug, water from the dripping umbrellas can be drained off without removing the helmet.



Rats Kept Out of Corncrib by Helmets Nailed on the Posts



Helmets on Fenceposts Prolong Their Life



At the Left, the Helmets are Shown in Use as Sanitary Nests; in the Center, as an Attractive Fruit Dish; and at the Right, as a Drip Bowl for an Umbrella Stand

Helmets Keep Rats Out of Corncrib

Truman R. Hart, of Ashtabula, Ohio, who won the third prize of the contest with his idea of utilizing helmets for bird baths, also contributed another plan that makes use of them for keeping rodents and other vermin out of corncribs and similar elevated storage bins. The idea involves nothing more complicated than capping each of the supporting posts with a trench helmet that has been drilled with two or three holes so that spikes can be driven through the plate into the post.

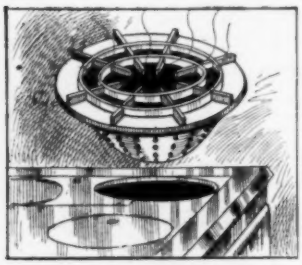
Fenceposts Preserved by Helmets

From saving the lives of soldiers on the battlefield, the trench helmets have been adapted by R. C. Leibe, of Chase

City, Va., to prolonging the life and usefulness of fenceposts on the farm. The drawing shows how each post is surmounted by a helmet that is held in place with a long spike. Naturally, this protection prevents water, that would cause the post to check and split within a comparatively short number of seasons, from coming into contact with the exposed end.

Trench Helmet as Charcoal Brazier

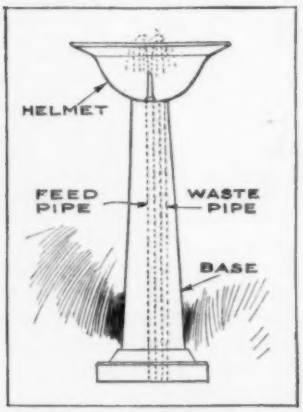
A rather original idea in which a trench helmet is used as a charcoal brazier in the kitchen stove during the heat of summer, is the contribution of Roland B. Cutler, of Springfield, Vt. The crown of the helmet is perforated with ¼-in. holes to permit circulation of air through the burning charcoal that is placed inside. In use, the helmet is set into one of the openings of the kitchen stove, and a grid from an oil or gas stove, resting upon a plate fastened to the rim, completes the arrangement.



This Brazier will be Found Very Effective during the Summer

A Helmet Drinking Fountain

From New Hartford, N. Y., Floyd A. Krenzer submitted his idea for making a sanitary drinking fountain, using the trench helmet as a receptacle for catching the waste water. The water-supply pipe, with a suitable nozzle at its upper end, comes through the center of the crown, while the overflow is carried off by a waste pipe that is arranged a little to one side of the center. The fountain is mounted on a pedestal, that can be made to correspond with its surroundings; in some instances, it might be found preferable to mount it on wall brackets.



A Helmet Makes an Effective Drinking Fountain

Helmet for Stovepipe Cap

To prevent rain from blowing down a stovepipe chimney and causing it to rust to pieces rapidly, Anthony Jacobucci, Philadelphia, Pa., suggests that the army trench helmet be used as stovepipe caps in the manner shown in the drawing. A strip of flat, stiff iron is riveted around the stovepipe as a reinforcement for helmet-supporting braces, which are riveted to it and the helmet. Not only does a cap of this kind prevent entrance of rain, but, as the helmet is somewhat larger in diameter than the stovepipe, there is slight possibility of a down draft blowing the smoke out into the room below.

A Helmet Cap on the Stovepipe Prevents Rust and Down Draft

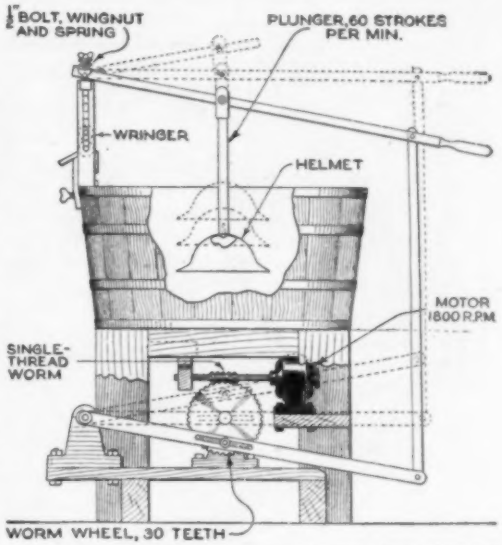
A Neat Sewing Stand

Arthur Gulbranson, of Chicago, Ill., has fashioned from a trench helmet a very substantial addition to the sewing equipment of the feminine portion of his family. As the photograph shows, feet, of ⅛ by 1-in. annealed brass strips, are riveted or soldered to the crown of the helmet. A combined spool rack and scissors holder, of the same material, is soldered in place, ⅜ by ⅞-in. brass pins being soldered to the crossbar to hold the spools. This crossbar has small projecting ears passed through slots in the sidepieces, soldered in place, then scraped bright. A clip and socket for the scissors are also soldered to one of the sidepieces, and a small brass pin, soldered to the top of the rack, makes a convenient holder for a thimble. The helmet and fittings were rubbed to a high polish with fine emery cloth and then lacquered, completing a very useful and substantial piece of work.

A Substantial and Attractive Helmet Sewing Stand

Trench-Helmet Washing Machine

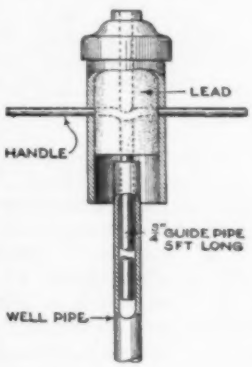
A washing machine that can be operated by hand, or driven by electric motor, is the plan of Edwin J. Bachman, of Fullerton, Pa. He already has the hand-power machine in successful operation but plans to "motorize" it, so that it will be driven by a ¼-hp. electric motor. The hand-power machine is simplicity itself and consists of nothing more than a lever to which the trench-helmet vacuum plunger is attached. The hand lever is fastened to the top of the wringer by means of a bolt, wingnut, and spring, while the plunger with the trench helmet attached to its lower end swings freely on the hand lever, so that the former is always in a perpendicular position. If electric current and a ¼-hp. electric motor are available, it requires but little additional effort to make the motor do the work by following the arrangement shown in the drawing, the most important part of which is the gear and lever arrangement for reducing the speed of the motor and transmitting the motion to the helmet. The lower lever is slotted to fit over a crankpin in the larger gear; the center of the worm wheel must be directly below the center of the helmet, and the pivots on the slotted lever directly in line with those on the hand lever. Then, with the pin in the worm wheel 2 in. off center, the stroke of the plunger will be 4 in. It will be observed that with such an arrangement there will be more or less swinging of the plunger, whether operated by hand or power, but this is desirable because it permits the plunger to come down at a different point in the tub at almost every stroke.



A Helmet Used as a Vacuum Plunger for a Washing Machine: The Drive Shown Is Only a Suggestion, and may be Modified in Any Desirable Way

Driving Well Pipes

Where water at slight depths below the surface is found suitable for household purposes, the most practical and inexpensive method of sinking a well consists in driving a screened drive point into the earth. After boring a few feet below the surface, place the pipe, with the point attached to the lower end, in the hole, and drive it down until the flow of water is reached.



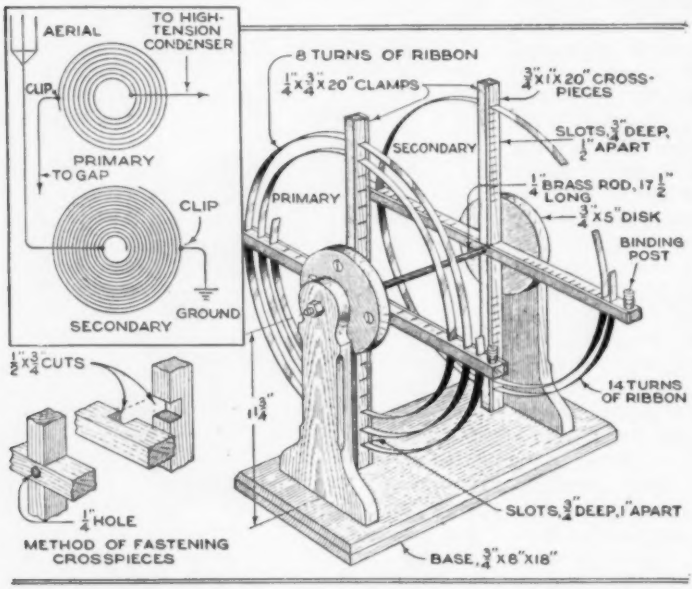
In order to drive the point to the desired depth, much care is needed to avoid injuring the pipe threads. To make the work simple, and a one-man job, the hammer shown in the drawing can be used with excellent effect. The 3½-in. diameter brass shell of an old pump cylinder was obtained, although a similar piece of pipe with a cap over one end will answer as well. Holes were drilled through opposite sides, large enough for a piece of ¾-in. iron rod to serve as a handle. A piece of ¾-in. pipe, about 5 ft. long, was screwed into the cap on the end of the pump cylinder, as in the drawing. The hammer was weighted by filling the interior with 12 lb. of melted lead. In use, the pipe guide is inserted inside the well pipe, and the hammer is lifted and allowed to drop, forcing the point deeper into the earth at each stroke. —Geo. G. McVicker, North Bend, Neb.

Typing to the Bottom of Sheets

When typewriting on postcards and envelopes, one often has occasion to write to the very bottom, but finds this impossible because the work slips out from under the feed roller. This trouble can be overcome, in most instances, by attaching the upper edge of the work to a somewhat larger sheet, with paper clips.

An Oscillation Transformer

The oscillation transformer is an important part of an efficient radio-transmitting set, and there are many types on the market; the best kind, for all practical purposes, however, is the so-called "pancake" type. This transformer is simple to make and inexpensive. The advantages of this type of transformer over the helix type are many, as it permits either direct or inductive coupling, insures a pure and sustained wave that can be sharply tuned at the receiving station, and cuts out interference. All parts of the winding are accessible to the clips, the primary and secondary slide along a horizontal brass rod that makes quick changes in coupling possible, and the full energy of the transmitter can be utilized without undue heating at the gap, as experienced with the old-style helix. The pancake transformer has made possible some remarkable records in amateur stations and nearly all of the record holders use it.



A Simple and Easily Made Oscillation Transformer, of the So-Called "Pancake" Type: All Material, with the Exception of the Ribbon, can be Picked Up around the Radio Laboratory

The woodwork may be any variety of wood, stained and finished to the satisfaction of the maker; poplar or birch will be found easy to work, and will take a mahogany finish well. The base and uprights are cut to the dimensions given, and assembled with 1¾-in. wood screws, driven through the bottom of the base. The brass rod is threaded and provided with a washer and nut at each end. Two wooden disks are screwed to the back of both primary and secondary crosspieces with 1-in. screws, and the crosspieces are slotted to take the required number of turns of ribbon. This ribbon may be of either copper or brass, about 1/16 in. thick by ¾ in. wide; it may be made up from a number of short pieces soldered together, or bought in one length, from any dealer in radio supplies. Clamps, in the form of light wooden strips, for holding the turns in place are fastened over the slots, so that there is no possibility of the ribbon working out of position. A binding post may be used at each outside ribbon terminal if desired, the lead wires to the condenser and aerial being soldered to standard helix clips, or clips can be used at all points. The clips from an old knife switch make ideal contacts.—F. L. Brittin, Chicago, Ill.

Using Old Engine Valves

Gas-engine valves, with bent stems or warped heads, can frequently be salvaged from the scrap pile and put to further use for other purposes. Recently, in placing a concrete garage floor, the metal channel in which the doors slid was bolted down by imbedding a number of old valves in the plastic concrete, head down; of course, lining them up with the holes in the channel and threading the stems. These served as efficient anchors, as the mushroom-shaped heads caught a firm hold in the cement. As a tube-patching fixture, a motorist inserts the stem of an old valve into a hole in his workbench. The tube to be patched is placed over the convex head of the valve, and the patch is made in the usual manner. In another instance, a similar valve was converted into a tail-lamp bracket by bending and threading the stem and drilling holes through the head so that the fixture could be bolted to the car; the head, in this case, was ground flat.

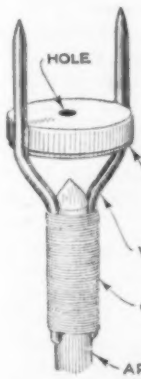
Waterproofing Rope Clotheslines

In order to make a rope clothesline waterproof and resistant to atmospheric influences, treat it in the following manner: Make two separate solutions, the first consisting of 1 lb. of soap dissolved in 5 qt. of water; the second is made by dissolving 1 lb. of ordinary alum in the same quantity of water. The soap solution is heated to about 120° F., and the rope immersed in it until the fibers have been thoroughly soaked; it is then removed, wiped free of superfluous solution, and transferred to the alum bath, in which it is allowed to remain for about 30 minutes, then taken out, and the excess solution wiped off.

This process impregnates the fibers of the rope with a soap that is insoluble in cold water, making it quite waterproof.

A Whistling Arrow

An arrow that will give a sharp and piercing whistle, when shot into the air, the tone rising and falling with the speed of the missile, is made as shown in the drawing. Two stout-wire prongs are bent as indicated and tightly bound to the shaft, the distance between the points being about 1 in. A small round tin box, of corresponding diameter, is obtained, and a hole, about ⅛ in. in diameter, is drilled through the center, care being taken to remove any burs or rough edges that might be around the holes. The box is placed between the prongs, to which it is held by soldering.—A. R. Mutton, Waterloo, Ia.

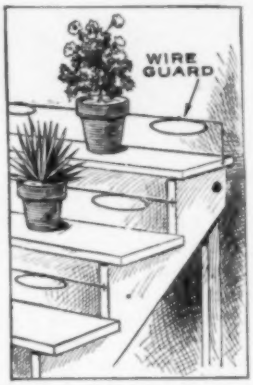


Hanging Pictures Straight

When framed pictures are always getting crooked, the appearance is far from pleasing, and the effect is annoying. To overcome this "shiftiness" of pictures, first hang the picture with its face to the wall. Adjust it so that it is hanging perfectly straight and then turn it around. The single twist in the cord or wire is usually sufficient to prevent it from slipping on the nail or hook from which it is suspended.

Guard for Flowerpot Stand

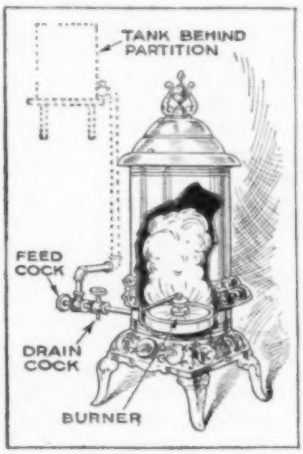
When flower stands that support potted plants are exposed to sudden gusts of wind, the plants are often blown from the shelves, with consequent damage to the plants and pots, and, also, in some cases, to the surroundings.

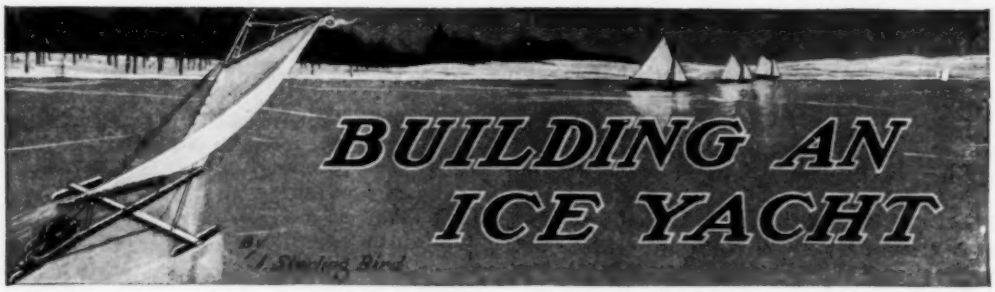


The drawing shows a neat and safe method of preventing the plants from being easily displaced. A piece of stiff iron wire has a number of loops formed in it, the ends being attached to the stand at such a height that the loops will fit the pots just underneath the shoulder.—Truman R. Hart, Ashtabula, Ohio.

An Oil-Burning Coal Stove

A resident of the Pacific coast, having on hand a kerosene burner and fuel tank, changed his wood and coal heating stove into an efficient oil-burning heater with but little trouble or cost. A burner, which was of the vapor type, with a disk above the flame, to deflect it horizontally, was set on the stove grate. A hole was then drilled through the side of the stove to admit the fuel-supply pipe. As the heater was used in the dining room, the feed pipe was passed through the partition into the kitchen and connected to the tank, which was supported on a shelf, as indicated in the drawing. A "gooseneck," made in the stovepipe by the use of four elbows and short lengths of pipe, permitted the escape of odors while reducing the waste of heat ascending the chimney.—Edwin M. Love, Alhambra, Calif.





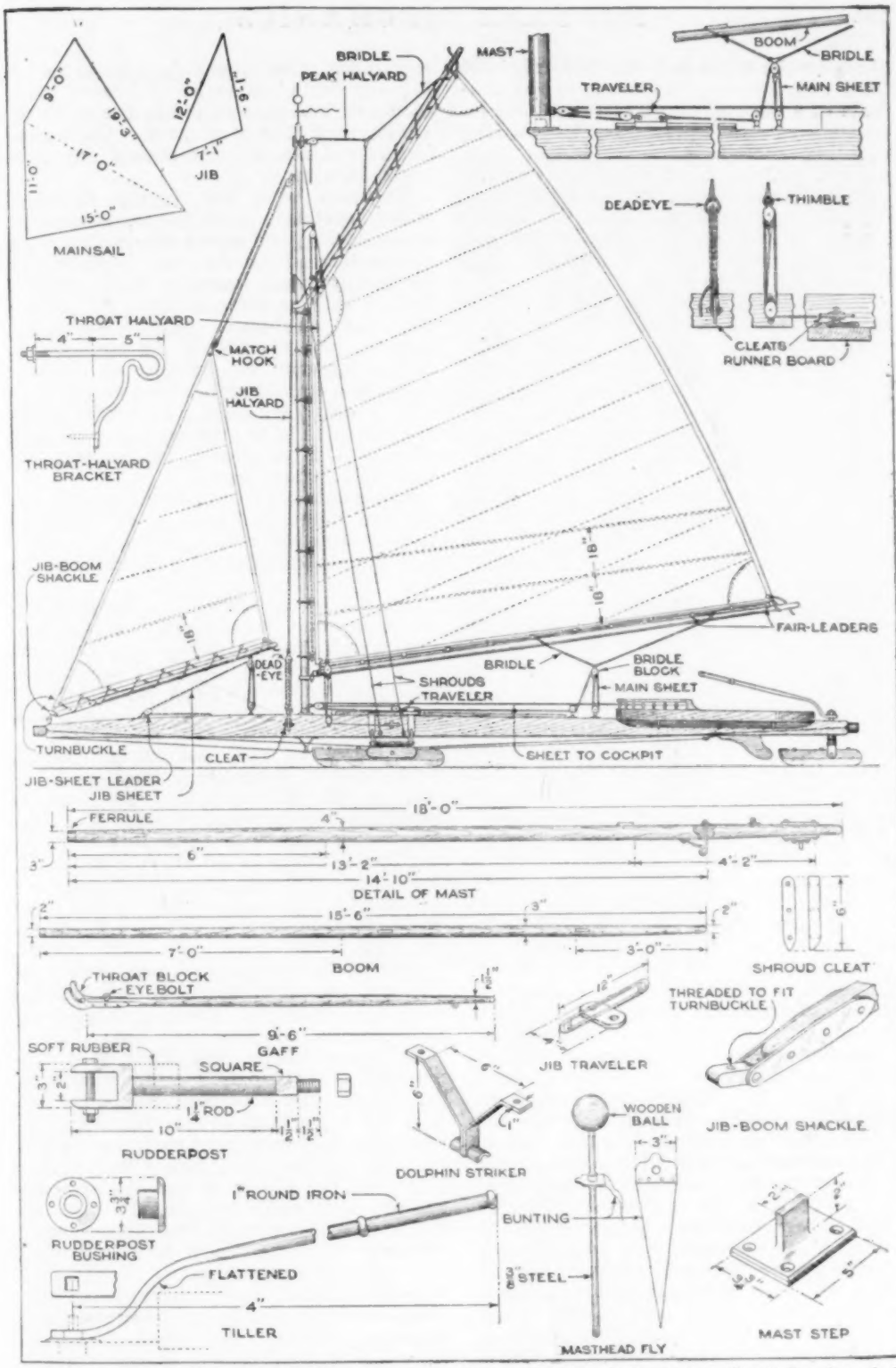
Part II—Spars, Rigging, and Assembling

ONLY the best grade of spruce is suitable for spars. Unquestionably hollow ones are lighter and stronger, but they cost a lot more. If expense is no objection, buy hollow spars, otherwise proceed as follows: For the mast select the clearest 4 by 4-in. stick to be found; for the boom and gaff a 3 by 3-in. stick, and for the jib boom, a 2 by 2-in. piece. Plane the stick for the mast fairly smooth on all four sides, then lay off a taper from a point 6 ft. from the foot, reducing the diameter to 3 in. at the heel. Plane all four sides, still keeping the stick square. From a point 5 ft. from the masthead, taper to 2½ in. Plane off all four corners, making an octagonal stick; then, with a small plane, round the spar, and finish with enough sandpaper and elbow grease—especially the elbow grease—to remove all plane marks. If any attempt is made to round the spar before tapering, it will be found impossible to keep it straight. A brass or iron ferrule, 2 in. wide, is fitted to the foot to prevent splitting, and a mortise cut to receive the mast step. Shroud cleats of apple wood or maple, of the form shown, are screwed at the points indicated, and the throat-halyard bracket and eyebolts put in place. The boom and gaff are identical in construction with the mast. The boom tapers to 2 in. at either end, with a large hole through the after end for the sail haul-out. The gaff tapers to 1½ in. at each end, with a haul-out hole at the peak, and oak jaws, fitted with a throat block, riveted at the throat. It is best to buy the jaws from a ship chandler. The jib boom is not tapered, but is rounded, and the jaws of the jib-boom shackle are riveted in place. The bridle cleats for the boom and gaff are similar to the shroud cleats, but smaller.

Wherever possible, brass or bronze should be used for fittings, although iron will do. The detail drawings show the masthead fly, throat-halyard bracket, and the two guy irons so plainly that no description is needed. The jib traveler is of ⅜-in. rod, riveted and brazed to a ¼-in. plate. Ten-penny nails make excellent cross pins for the traveler; the object of these is to prevent the sheet block from slipping around to the underside of the traveler. The two members of the mast step are also riveted and brazed. The dolphin striker is of ¼ by 1-in. stock, with a half section of pipe brazed in the lower end of the "V." The jib-boom shackle is all brass, with the end hole threaded to fit the forestay turnbuckle. The gammon-strap set cannot be made until the backbone and runner-plank parts are in place. It will probably be found advisable to cut strong paper patterns of the gammon straps for the blacksmith or machinist to work from. The bolts on the straps are riveted and brazed to the flat iron. Unless cast of bronze and turned, the rudderpost must be forged by a first-class blacksmith, it being a somewhat difficult piece of work. It is fitted with a soft-rubber bumper, which greatly relieves the shock of sailing over rough ice. Of course, the tiller must be fitted to the post so that there is no lost motion. The handle is wound with cotton cord, filled with shellac, and varnished. Plates may be used in place of the rudderpost bushings, but will soon wear, and will, in turn, wear a groove in the post, so that bronze or cast-iron bushings, of the form shown, are well worth the extra expense, as they will last forever.

As there are a number of first-class sailmakers who specialize on ice-yacht sails, one of them should be selected, and the sail plan sent to him when placing the order. Yacht twill will make strong, durable sails at a low price, but the better grades of sailcloth are more satisfactory. In giving the order, the fact that the sails are for an ice yacht should be mentioned, together with the following specifications: jib to have snap hooks for forestay, and be made to lace to the boom, or the foot will be cut as for a sailing yacht. Mainsail to have thimbles in pairs on hoist for mast-hoop lacing, and single thimbles on foot. Otherwise leave it to the sailmaker. He knows.

The cockpit cushions are made of good-quality ticking, covered with corduroy or



Details of Sails, Rigging, and Hull Fittings: In the Upper Right-Hand Corner Is a Detail Drawing of the Method of Rigging the Main Sheet; below This is Shown the Method of Fastening the Jib, Peak, and Throat Halyards to the Purchase Blocks

plush on the edges and one side only, and filled with upholsterer's moss, or the contents of a discarded hair mattress; 2½ in. is sufficient thickness. In length, the covering should be 6 in. longer than the cockpit, as proper filling shortens the cushion considerably, and if made long, the finished cushions will fit tightly enough to stay in place. The buttons for tacking should be covered with the same material as the cushion.

The shrouds, forestay, and guys are made of ¼-in. iron wire, and the bobstay of ⅜-in. wire. In making up each piece, the measurements must be taken from the boat itself to avoid mistakes. Loops to fit the masthead, and the ends of the backbone, are first spliced; then the opposite ends are spliced into ⅜-in. galvanized shackle-and-shackle pipe turnbuckles of the slot and cotter-pin pattern. (Never use any hook turnbuckles.) All turnbuckles should be fitted with wire-rope thimbles, and all loops and splices tightly served with hard cable-laid cotton cord about ⅛ in. in diameter, filled with shellac, and varnished. The bobstay has an eye splice formed to fit the backbone nose; from there it runs down under the dolphin striker and aft to the anchor iron screwed to the bumper. The bridles for the boom and gaff are ¼-in. wire, with loops finished as above. The halyards should be crucible cast steel, 3/16 in. in diameter, finished as follows: The jib halyard is spliced in a pair of match hooks with wire-rope thimble for attaching to the jib, and the lower end spliced around a lignum-vitæ deadeye. The upper end of the peak halyard is spliced into a self-locking brass bridle fitted with a thimble, and the lower end around a thimble to receive the purchase block. The throat halyard has a thimble in each end, one for attaching to the eyebolt at the jaws of the gaff, and one for a purchase block at the lower end. The splices are finished in the same manner as for the shrouds and stays. All Manila rope is ⅜-in., spliced in, with free ends moused with sail thread. The main sheet proper is spliced into the becket of the bridle block at one end, and around a thimble at the other, for attaching to the main-sheet traveler by a screw shackle. This traveler is hauled along the track by a purchase attached to the foot of the mast, giving ample power to trim sail easily during a race, without luffing and losing speed. The remaining ropes are so plainly shown in the illustration as to require no further description.

The halyard blocks are of the type designed for wire rope only, all others being any first-class make of bronze yacht block, with fittings suited to the work for which each block is used. Galvanized blocks will not do, nor should any have hook fittings.

Together with the rigging described above, eyebolts, mast hoops, gooseneck, cleats, lacing, and screw fair-leaders must be purchased from the ship chandler. The jib and mainsail lacing is 3/16-in. braided cotton, and the same material is used for the sail haul-outs. Fair-leaders are screwed into the top of the main boom, alternating with the thimbles on the foot of the sail, and through all is run a Manila stop, drawn very tight. Two fair-leaders are also used in the runner plank on each side of the backbone, for lashing the halyard-purchase ropes.

The whole boat, including the sails, but not the runners, should be set up complete outside the shop to prove that every part fits properly before putting it on the ice.

Always, when setting up, the gammon straps are first bolted tight, then the runner plank and backbone squared by measuring from the center of the rudder-post hole to a certain point on corresponding chocks at opposite ends of the plank, tightening the guys accordingly.

A combined sail and cockpit cover, preferably of waterproof duck and extending the full length of the boat, is necessary for protection from the elements. It should be made in one piece, with an opening to go around the mast, and have grommets along each edge for ties to bind it down tightly to the guys and bobstay. A horse set under the boom will hold the cover up, tent-fashion. Colors for a craft of this size should be 18 by 12 in. During snow, the runners should be removed, dried, greased, and carefully put away in their box.

In many things one finds that the pleasure of anticipation and preparation far exceeds the actuality; this, however, does not apply at all to ice-yachting. For while the construction of such a craft will give the builder many happy hours' employment, the sailing of it will prove the greatest imaginable joy after the tricks of the trade are mastered, and the only way properly to master them is racing with some old hand at the game. When that incurable disease, "ice-yachting fever," attacks one's blood, the only relief is ice-yachting. While the building hardly comes under the head of woman's work, the sailing surely may be termed woman's sport as much as is running a motor car.

Transferring Prints to Glass

It is sometimes desirable to transfer photographic prints to glass, or to some other solid substance that may or may not be transparent, to obtain some particular decorative effect.

The surface of the glass, or other substance, is first coated with a half-and-half mixture of turpentine and Canada balsam, or, if obtainable, dammar varnish. The glass is set aside until the varnish has become quite "tacky;" the time required for this will vary with the dryness of the atmosphere. The print to be transferred is soaked in water until limp, and the surplus water is removed by pressing it between sheets of lintless blotter. The print is then carefully laid on the prepared surface, another blotter being used to press it into place and also to prevent the possibility of water or air bubbles being confined underneath the paper. When this is completed, the whole work is set aside until it becomes thoroughly dry, which will require from one to two days.

The next operation is the removal of the paper backing, so that only the film containing the picture will be attached to the base. The paper is removed by wetting the fingers and rubbing it off in small rolls, and it will be found, after a little practice, that this is not at all difficult.

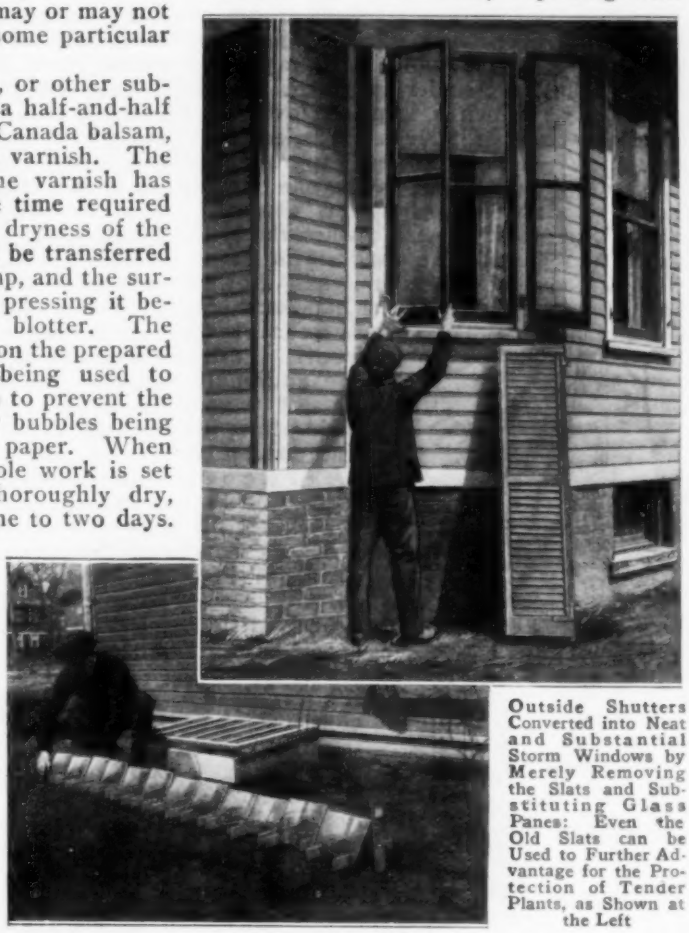
If developing-out paper is used, a little more work will be required, as the paper stock is heavier than that ordinarily used for printing-out papers. When the paper has all been removed, the appearance and transparency of the finished work are improved by an application of transparent varnish. The same process can be applied to the decoration of opaque surfaces. However, in the latter case, the picture will be reversed, as the print is applied to the surface face down.—A. C. Cole, Chicago, Ill.

Soap Dish as a Motor-Car Fitting

A nickelplated soap dish, a familiar fitting in every bathroom, can be made to serve another useful purpose when mounted on the dash of an automobile, in front of the driver. Such a receptacle makes a convenient place for carrying matches and similar small articles.

Storm Windows Made from Shutters

A snug-fitting and easily opened storm window can be made by replacing with glass the slats in the outside shutters of those rooms that are difficult to keep at a comfortable temperature in the winter. The slats can easily be removed and the glass panes that take their place are held by strips of light molding. The principal advantage of using the shutters as storm windows, aside from the ability to open them easily on mild days, is that they are already cut to fit and the hardware is already in place.

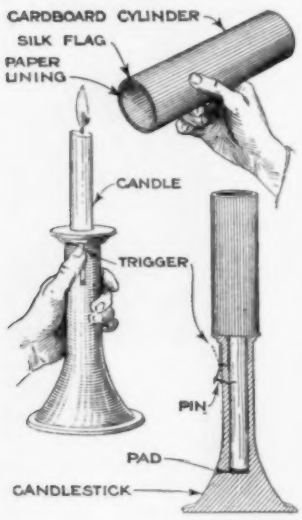


Outside Shutters Converted into Neat and Substantial Storm Windows by Merely Removing the Slats and Substituting Glass Panes: Even the Old Slats can be Used to Further Advantage for the Protection of Tender Plants, as Shown at the Left

Even the old slats can be used to further advantage, as shown in one of the illustrations, by using them to support sheets of glass for the protection of early spring plants. Notches are cut into the slats at each end, and these serve to hold old photographic negatives in the manner illustrated in the lower photograph.—Walter C. Harris, Brooklyn, N. Y.

The Magic Candle and Flag

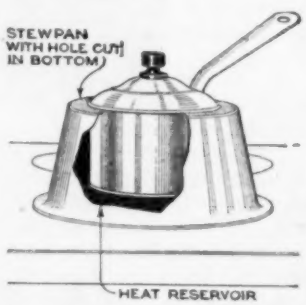
This is a trick that can easily be performed by the amateur with very mystifying effect, and the necessary apparatus is simple to make. The trick is this: A candlestick, with a candle in it, is placed on a table; a cylinder is shown to be empty, after which it is placed over the candle so that the latter is concealed; the "magician" makes a few appropriate passes, at the same time saying one of the seven magic words, of which "abracadabra" is the most "potent"; when the cylinder is removed, the candle will have disappeared, and the tube is still shown to be empty. Then a flag or handkerchief is extracted from it. While the audience is still wondering how it was done the operator reaches into a coat pocket, produces the candle lighted, and places it back in the candlestick.



The apparatus required consists of the trick candlestick illustrated, two imitation candles, a cardboard cylinder, and a silk flag, or handkerchief. The base of the candlestick is hollow, and when the cylinder is placed over it, a trigger is pressed that allows the candle to drop out of sight into the hollow base. The flag is folded and placed like a lining within the cylinder, and is kept from sight of the audience by a paper lining, as indicated in the drawing. The cylinder is prepared and the second candle placed in the magician's pocket before the performance. This candle has a match head for a wick, and as it is taken from the pocket the match is struck on a piece of sandpaper that is pinned in a convenient place on the inside of the coat. The candlestick can be bought ready-made, or it may be made from wood. The hole in which the candle drops must be large enough to make a snug but free fit, and deep enough to conceal the candle entirely when resting upon the bottom. A small wire pin projects through the candlestick just far enough to hold the candle in place, yet so that a very little movement will release it. A bent strip of sheet metal serves as a trigger, and this is fastened at its center to the candlestick, very loosely. When the cylinder is placed over the candle the performer presses the trigger and lets the candle fall. In this position the top of the candle should be even with the wire pin, so that when the second lighted candle is set in the candlestick it will rest on top of the first one. The candles can be made from metal, paper tubes, or wood. If tubes are used, corks are inserted into the ends to hold wicks. In any case, have a wick on one candle and a small hole for a wick on the other. Enamel them white. For the light effect in the second candle, a match end is inserted in the wick hole. The cylinder which is put over the candle to hide it can be made from cardboard or sheet metal and finished as desired. Fold the flag and place it so as to be close to one end of the tube. When taking the flag from the cylinder, hold the cylinder and the paper lining tightly together, at the end farthest from the flag, so that the latter can be pulled out without disturbing the paper.—Norman B. Taylor, Pomona, Calif.

An Efficient Stewpan

The efficiency of the ordinary stewpan can be considerably increased, and at the same time, the quantity of gas required to boil the contents of the pan will be cut down. All this is done by cutting a hole, just large enough to permit insertion of the stewpan, in the bottom of an old pan, as in the illustration. It will be noted that all the heat rising within the covered area will come into contact with the sides as well as the bottom of the upper pan. Another feature of value that commends an arrangement of this sort, is that the contents of the stewpan will not burn as quickly as when in actual contact with the stove top. As a glue-pot improvement, where gas is used for heating the pot, the same idea can be applied with excellent effect.

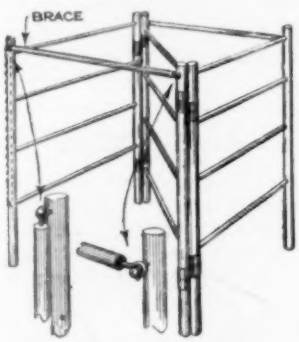


Typewriter-Ribbon Substitute

When the typewriter ribbon wears out and another is not easily obtainable, a sheet of carbon paper can be used with good results. The carbon paper is fed into the machine between two sheets of paper, with the carbon face in contact with the face of the letterhead. The outer sheet of paper is used to reinforce and protect the carbon paper.—Chas. N. Shaw, Jr., Gordon, Ga.

Bracing the Folding Clotheshorse

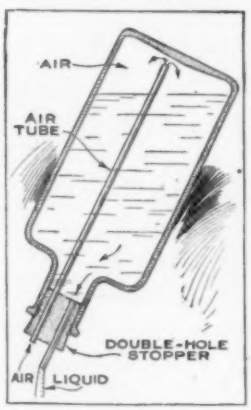
The common folding clotheshorse admirably answers the purpose it is intended for, but suffers from lack of stability, a slight push being enough to make it fall over or close.



To overcome this, the two bars or braces shown in the drawing were fitted to the clotheshorse, not only making it much more rigid, but affording additional drying space. Round-headed screws were turned into the posts as indicated, and a screweye into each end of the braces. One of the eyes was closed, while that in the opposite end is open and free to slip over the screw.—M. E. Duggan, Kenosha, Wis.

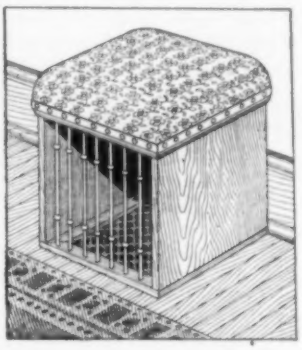
Attachment for Pouring Liquids

One of the easiest and most effective methods of rigging a bottle for pouring liquids without removing the cork is shown in the drawing. Two pieces of glass tubing are inserted through holes in the stopper in the manner indicated. Using an arrangement of this character, the liquid will flow from the container smoothly and without bubbling.—Curtis Ralston, Chicago, Ill.



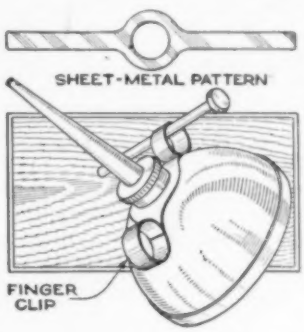
A Seat for the Furnace Register

In houses heated by a hot-air furnace, a better distribution of the warm air along the floor, where it is most needed, can be obtained by using register boxes such as that shown in the drawing. In addition to this, it affords a convenient seat for getting warm quickly when coming from the outside cold. The box is a little larger than the outside measurements of the register plate, and at least one side should be open. The top may be padded and covered to match the upholstery on the furniture in the room.



Finger Clips for Oilcans

A simple device, which has been found advantageous in the handling of an oilcan of the spring-bottom type, especially when the hands are greasy, consists of a finger clip, made and attached as indicated. The clip is made from a strip of sheet metal, with an opening at the center to fit over the neck of the can, where it is held in place by the spout. The ends of the sheet-metal strip are formed into rings for the insertion of the first and second fingers. All edges should be finished off smoothly to prevent possibility of cutting and scratching the skin. The oilcan may also be hung up by the clip, and in this manner kept out of the way.

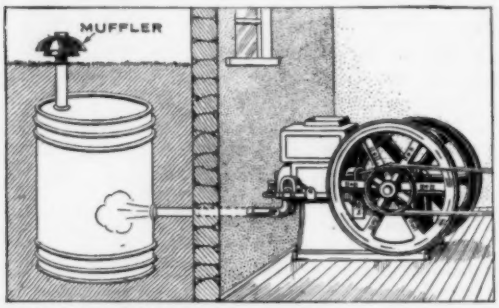


¶When playing cards become old, worn, and rough, making it difficult to deal and shuffle them with the desired speed, they can be made almost as slick as new by dusting them freely with talcum powder.

JAN 12 1932

Silencer for Home-Lighting Plants

One of the objectionable features of a lighting plant, as it is usually installed in the basement of the country home, is the noise and odor of the exhaust. The drawing shows a method of muffling the

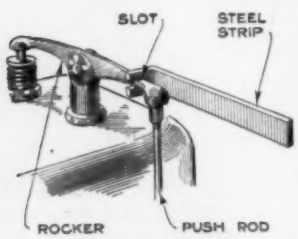


An Underground Expansion Chamber in the Form of a Barrel or Old Hot-Water Tank Receives the Exhaust from the Home-Lighting Plant and Makes Its Operation Practically Noiseless

sound of the exhaust that makes operation of the plant practically noiseless. The regular engine muffler is removed and the exhaust pipe is led to a barrel or old water-heating tank that is buried under the ground. A pipe from the tank or barrel, as the case may be, is led above the surface and the engine muffler attached, as shown in the drawing. By this method the exhaust gases are discharged into the barrel, where they expand and issue from the muffler at little more than atmospheric pressure and without the annoying noise.

Rocker Lever for Overhead Valves

A tool that expedites the removal of valves or push rods from an overhead-valve type of automobile engine, is shown in the drawing. With an average of 12 such valves to be removed from the engine, considerable time and effort are saved by the use of some form of tool for compressing the valve spring. The tool consists of nothing more than a strip of steel, bent at right angles and slotted as indicated. The long part forms the handle, and when applied to the rocker arm, only an upward movement of the handle is necessary to raise the rocker out of contact with the push rod.



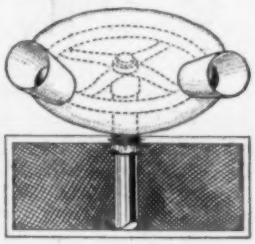
Protecting Fire Hydrants from Snow

In regions of heavy snowfall, and where the snow is likely to remain until it thaws, such as the grounds of large public institutions, the fire hydrants are quite likely to be so covered up, that valuable time might be lost in locating them. Under such conditions some way of marking the locations of the hydrants is highly desirable.

The hydrants can be effectively identified and, to a certain extent, prevented from freezing up, if, early in the winter, they are covered up with a barrel from which one of the heads has been removed. It is consequently an easy matter, in case of fire or fire drill, to lift off the barrel without having to dig the snow from around the hydrant.—James R. Noble, Portsmouth, Ont.

A Muff for the Autoist's Hands

Driving an open automobile in the winter time is far from comfortable, even when the side curtains are up, and, if the driver's hands are numbed with cold, it is easy to imagine situations where driving would be dangerous.



The drawing shows a closely woven cloth muff, in the form of a bag, made large enough to fit loosely over the steering wheel, the mouth of the bag being tied to the steering column. Openings for the hands are provided with elastics, so that the muff will be held closely to the wrists; or cuffs, such as shown, can be added to fit over the coat sleeves.

An "Apartment" Ironing Board

A convenient ironing board for the particular use of apartment dwellers, or those living in rooms where the amount of space is closely limited, can be made from an ordinary board, about 3 ft. long and 10 in. wide. This is all that is needed, with the exception of the necessary covering. In use, the drawer of the kitchen table, or a convenient drawer in a dresser, is pulled out, and the board is supported by the drawer, the end of the board being inserted inside the drawer so that it bears against the top of the opening.—R. Swedene, San Francisco, Calif.